GENERIC SCOPE OF WORK BASIC CONTRACT

CONTRACT TYPE [CHECK ONE]

☐ Specific Rate of Pay

☒ Cost Plus Fixed Fee

☐ Lump Sum

CONTRACT DATE: ____3/21/08_____.

PROJECT NUMBER: _C 0252-399_____.

PROJECT LOCATION: _I-25, Lincoln Ave to County Line Road.

PROJECT CODE: ____16602_____.

THE COMPLETE SCOPE OF WORK INCLUDES THIS DOCUMENT (ATTACHED TO THE CONTRACT FOR CONSULTANT SERVICES) AND, IF REFERENCED,

SECTION 1	PROJECT SPECIFIC INFORMATION	Dated: 3/21/08
SECTION 2	PROJECT MANAGEMENT AND COORDINATION	Dated: 3/21/08
SECTION 3	EXISTING FEATURES	Dated: 3/21/08
SECTION 4	REFERENCE ITEMS NEEDED BY THE CONSULTANT	Dated: 3/21/08
SECTION 5	GENERAL INFORMATION	Dated: 3/21/08
SECTION 6	ENVIRONMENTAL WORK TASK DESCRIPTIONS	Dated: 3/21/08
SECTION 7	PRECONSTRUCTION WORK TASK DESCRIPTIONS	Dated: 3/21/08
SECTION 8	SERVICES AFTER DESIGN	Dated: 3/21/08
SECTION 9	CONTRACT CONCLUSION (CHECKLIST)	Dated: 3/21/08
APPENDICES		Dated: 3/21/08

SECTIONS 3 AND 4 AND SECTION 6 ARE AVAILABLE AS SEPARATE DOCUMENTS AND APPLY TO THE CONTRACT ONLY BY REFERENCE

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APPENDICES

TABLES

SECTION 1
PROJECT SPECIFIC INFORMATION
3/21/08

1 PROJECT BACKGROUND

CDOT completed the "South I-25 Corridor and US 85 Corridor EIS" with a Record of Decision (ROD) in 2001 and a Revised Record of Decision in 2002. The EIS identified improvements to the I-25 corridor south of County Line Road to Castle Rock. This project will address improvements identified in the EIS between the north end of the RidgeGate interchange, which is currently under construction, and County Line Road. I-25 will be widened to accommodate one additional through lane in each direction in this area along with widening the north bound County Line off ramp to two lanes. The proximity of the light rail on the west side of I-25 requires that all of the widening be completed on the east side of the highway.

The project will also attempt to accommodate the "Near Term Improvements" described in the "Lincoln Avenue Corridor Improvement Recommendations and Lincoln Avenue/I-25 Interchange Alternative Analysis" which was completed by CH2MHill for Douglas County and the City of Lone Tree. These improvements involve modifications to the south bound I-25 off ramp at Lincoln Ave.

2 PROJECT GOALS

This project is intended to produce the following improvements:

A. Increased capacity

B. Improved Safety

C. Higher level-of-service

D. Improved riding surface (smoother or stronger pavement)

~~E. Bridge Replacement~~

~~F. Resurfacing, Restoration, Rehabilitation~~

G. Reconstruction

H. Other

3 PLANNED IMPROVEMENTS

This project is located on SH____25____, at milepost_____193.6_____, in_Douglas_____County.

4 PROJECT COSTS

The construction cost of this project is estimated at $__20,000,000 _.

5 WORK DURATION

The Pre-construction work described in this scope shall be completed by the end of April, 2010.
The Design support during construction shall be completed by the end of December, 2011.

6 CONSULTANT RESPONSIBILITY AND DUTIES

The work described in this scope will consist of a blended team of CDOT and Consultant forces as described in the Preconstruction work task descriptions in Section 7. The CDOT / Consultant team is responsible for:

General Engineering Services - The scope for general engineering services may include, but shall not be limited to the following activities:

a. Provide conceptual drawings, graphs, or charts for the Region's planning, environmental, or other units as needed.
b. Provide support for planning activities.
c. Conduct studies – transportation, traffic, environmental, etc.
d. Provide design services for off systems or other modes of transportation alternatives.
e. Provide drafting or CADD services. All CADD work for CDOT will be done using Microstation and Inroads.
f. Provide support to research or search county, state, or other areas for records or documents relevant to the project or task.
g. Provide lighting plans or analysis.
h. Provide or acquire design services as required to complete tasks not specifically defined in the outline, but that may be required by specific task order.

Roadway Design Activities - The scope of work for roadway design activities may include:

a. Furnish design and quantity calculations of the various components of roadway construction, which could include lighting, landscaping, and irrigation design, ditch design, waterline, and sanitary sewer design.
b. Furnish detailing and drafting services with the latest version of Microstation and Inroads.
c. Attend Scoping, field inspection review (FIR), and final office review (FOR) meetings and provide meeting minutes, and if necessary attend other meetings which are relative to the project and provide meeting minutes.
d. Prepare CDOT or other design related forms as required.
e. Prepare final plans, specifications, and estimate (PS&E). Estimate(s) will be given to the CDOT/PM and data will be entered into the CDOT Trns-port application system.
f. Prepare revisions under advertisement or prepare PS&E for re-advertisement.
g. Provide design service under construction.
h. Design and layout of intersections and interchanges.

Structural Design Activities - The scope of work for structural design activities may include:

a. Furnish design calculations for various highway structures or portions of highway structures including, but not limited to, walls and bridges.
b. Furnish detailing services including drafting and quantity calculations for various highway structures or portions of highway structures.
c. Inspect and rate highway bridges.
d. Provide wall and bridge design and detailed review of work performed by other designers.

Hydrology Activities - The scope of work for the hydrology activities may include:

a. Collect historical drainage data.
b. Establish drainage basin data.
c. Select run-off parameters and predict peak flow.

Hydraulics Design Activities - The scope of work for hydraulics design activities may include:

a. Furnish the size and location of drainage structures.
b. Furnish storm sewer design.
c. Furnish erosion protection design and NPDES requirements.
d. Furnish quantity calculations for drainage structures.
e. Design of water and waste water systems.
f. Irrigation system designs including, but not limited to typical ditches, traveling gun irrigations systems, and other center pivot systems.

Traffic Engineering Activities - The scope of work for traffic engineering activities may include:

a. Traffic data collection.
b. Review traffic studies or analyses for compliance with the State Highway Access Code.
c. Field inventory existing signs, striping, signal hardware and equipment, luminaries, etc.
d. Perform passing zone analyses to validate or update current striping logs.
e. Furnish design and quantity calculations necessary to prepare signal, signing or pavement marking plans.
f. Furnish detailing and drafting services as needed.
g. Attend scoping, field inspection, and final office reviews.
h. Prepare signing, striping, signal, construction signing plans and schedules for projects.
i. Prepare final plans, specifications, and estimates as needed.

Architectural Activities - The scope of work for architectural activities may include:

a. Furnish design and quantity calculations of the various components of highway-related facilities.
b. Furnish detailing and drafting services.
c. Prepare final plans, specifications, and estimates.
d. Evaluation and assistance in the resolution of problems encountered during construction of transportation-related facilities and/or state buildings.

Landscape Architectural Activities - The scope of work for landscape architectural activities may include:

a. Provide estimates of quantities of native seeding and mulching for the plans.
b. Determine most economic landscape alternative, finalize concept, and complete the plan.
c. Verify that an acceptable safe recovery distance exists between traveled way and all trees to be planted.
d. Coordinate all special permits that may be required.
e. Coordinate ROW requirements.
f. Write Special Provisions and submit to the CDOT/PM with the completed roadside plans.
g. Submit the approved plan/special provisions to the Design Engineer for inclusion in the project plans.
h. Verify availability of plant materials and submit letter to the CDOT/PM certifying that designated plants are available.

Noise Study - The scope of work for noise study activities may include:

a. Predict or measure present noise levels.
b. Analyze noise levels for all alternatives, including the no-build. Noise level models will be made with at least CDOT's stamina noise computer model or better. Distances at which noise levels exceed acceptable levels will be determined for each alternate and plotted on corridor maps.
c. Identify locations where noise abatement measures are needed, determine which measure is feasible and cost effective, and estimate construction and maintenance costs.
d. Prepare a noise assessment report for acceptance by CDOT.

Materials Testing and Geotechnical Activities - The scope of work for materials testing activities may include:

a. Testing results certified by professional engineer.
b. Conduct subsurface investigations, instrumentation, reports, preliminary and final designs including but not limited to landslides, rockfall mitigation, MSE walls, ground nail walls, retaining walls, micropiles, bridges and other foundation designs.

Environmental Services - The scope of work for environmental services may include:

a. Review environmental conditions, determine required permits.
b. Delineation and mitigation recommendations of wetlands.
c. Prepare and/or review environmental documents for CDOT projects.
d. Conduct or assist in public meetings.

Surveying - The scope of work for surveying activities may include:

a. Perform surveys related to the horizontal and vertical alignment of the project.
b. Perform GPS control survey.
c. Perform topographical surveys.
d. Perform cross section surveys.
e. ROW support for design.
f. Perform utility surveys (include potholing).
g. Perform wetland survey.
h. Prepare project control diagram.

Right-of-Way Plan Preparation - The scope for right-of-way plan preparation may include:

a. Determine parcels.
b. Write parcel legal descriptions.
c. Determine parcel size.
d. Prepare R.O.W. plan tabulation sheet.
e. Prepare R.O.W. plan sheets.
f. Prepare monument tabulation monumentation sheets.
g. Prepare land survey control diagram.
h. Prepare total ownership maps.

Descriptions of the consultant responsibilities and duties are further described in this document.

7 WORK PRODUCT

The Consultant work products are:

A. Reports

B. Field Inspection Review (FIR) Plans and Estimates

C. Final Office Review (FOR) Plans, Specifications, and Estimates

D. AD/Bid Plans, Specifications, Cost Estimate

E. Construction Plan Package

F. Project Coordination

G. Schedules

H. Meeting Minutes

I. Professional Engineer Stamped Record Sets

Detailed work product requirements are described in the following sections. All work required to complete this Scope of Work requires the use of English Units.

8 WORK PRODUCT COMPLETION

All submittals must be accepted by the CDOT Contract Administrator or designee.

9 ADDITIONAL PROJECT INFORMATION

Additional information regarding this project is included in the following documents:
[List available pertinent documents]

A. South I-25 Corridor and US 85 EIS / ROD

B. Lincoln Avenue Corridor Improvement Recommendations and Lincoln Ave. / I-25 Interchange Alternative Analysis

Copies of these documents are available for review at the Centennial Residency, Phone no. 303-365-7230, 7328 S. Revere Pkwy, Centennial, Colorado 80112. The documents are available for loan to allow consultants to review or copy the documents as needed. Please call for an appointment to review or borrow the documents.

10 SCOPE OF WORK ORGANIZATION

This draft scope of work has been reviewed by the Department and reflects a plan of approach based on the known goals. One factor determining the selection of a consultant is the ability of that consultant to analyze the project goals, evaluate the work elements, and formulate a work plan. This process may produce new approaches or modification to the project work elements. Because of that, all consultants should be aware that the Final Scope of Work for a project will be produced with input from the selected Consultant.

SECTION 2
PROJECT MANAGEMENT AND COORDINATION
3/21/08

1 CDOT CONTACT

The Contract Administrator for this project is: __Kevin Radel_____, Region_One_____. Centennial Resident Engineer.

Active day-to-day administration of the contract will be delegated to:

A. Name: _Pat Friesen_____.

B. Title: __Project Manager_____.

C. Address: _7328 S. Revere Pkwy, unit 204A, Centennial, Colorado___.

D. Telephone: ___303-365-7242__.

E. Fax: __303-790-1037_____.

2 PROJECT COORDINATION

Coordination will be required with the following:

A. Cities

B. Counties

C. Railroads

D. Regional Transportation District (RTD)

E. Denver Regional Council of Governments (DRCOG)

F. Metropolitan Planning Organizations (MPO's)

G. U.S. Army Corps of Engineers

H. Urban Drainage & Flood Control District (UD & FCD)

I. Federal Emergency Management Agency (FEMA)

J. Division of Wildlife

K. Environmental Protection Agency (EPA)

L. Federal Highway Administration (FHWA)

M. Federal Transit Authority (FTA)

N. Utilities

O. Colorado Department of Public Health and Environment (CDPHE)

P. Other

The consultant should anticipate that a design which affects an agency will have to be accepted by that agency prior to its acceptance by the Colorado Department of Transportation. Submittals to affected agencies will be coordinated with CDOT.

SECTION 3
EXISTING FEATURES
3/21/08

1 STRUCTURES

HWY	MP	STR. #	DESCRIPTION
0025A	192.750	F-17-PF	SIGNC NBND ML - VMS
0025A	192.990	F-17-JM	2 SBGC LINCOLN AVE I 25 ML
0025A	193.000	F-17-PY	1 SIGNC NBND ML 40
0025A	193.080	F-17-JR	1 SIGN SBND ML + RAMP
0025A	193.100	F-17-QK	1 SIGNC SBND ML
0025A	193.200	F-17-QL	1 SIGNC SBND ML
0025A	193.580	F-17-II	2 SIGNB MEDIAN
0025A	193.638	F-17-MK	1 SIGN SBND ML - VMS
0025A	193.880	F-17-IH	1 SIGN NBND ML + RAMP
0025A	193.970	F-17-JQ	1 SIGNC SBND RAMP
0025A	193.980	F-17-JP	1 SIGNC SBND ML
0025A	194.100	F-17-IG	2 SIGNB MEDIAN
0025A	194.270	F-17-IF	1 SIGN NBND ML + RAMP
0025A	194.313	F-17-IQ	6 SBGC RAMP TO SH 470 WBD R I 25NB TO C470 WB RAMP
0025A	194.316	F-17-JW	5 SBGC I 25, SH 470 ML R E470WB TO I25SB RAMP
0025A	194.317	F-17-JX	7 SBGC RAMP TO E 470 EBD R I 25SB TO E470 EB RAMP
0025A	194.340	F-17-IT	4 SBGC I 25, SH 470 ML R C470EB TO I 25NB RAMP
0025A	194.349	F-17-JV	2 CPGC SH 470 ML, RAMPS I 25 ML NBND
0025A	194.350	F-17-JU	2 CPGC SH 470 ML, RAMPS I 25 ML SBND
0025A	194.580	F-17-ID	3 CPGC RAMP TO COUNTY LINE RD R RAMP TO I 25 NBND
0025A	194.590	F-17-IE	3 CPGC RAMP TO SH 470 ML RAMP TO I 25 SBND
0025A	194.910	F-17-KA	1 SIGN SBND ML
0025A	195.130	F-17-DK	4 CSGC COUNTY LINE ROAD I 25 ML

2 UTILITIES

CDOT
Level 3
Adesta

Contact Utility Notification Center of Colorado (U.N.C.C.) at 1-800-922-1987

3 IRRIGATION DITCHES

N/A

4 RAILROADS

RTD light rail
Fast Tracks SE Extension

Note:The above is a list of the known features in the area. It should not be considered as complete. The Consultant should be alert to the existence of other possible conflicts.

SECTION 4
REFERENCE ITEMS NEEDED BY THE CONSULTANT
3/21/08

1 CURRENT CDOT MANUALS, SPECIFICATIONS, STANDARDS, ETC.

Electronic files of applicable standards. All CDOT forms specified in this document.

The consultant shall obtain and utilize the most recent CDOT adopted references including standards and specifications, manuals and software or as directed by the CDOT/PM. These documents include but are not limited to those listed in Appendix A of this document.

SECTION 5
GENERAL INFORMATION
3/21/08

1 NOTICE TO PROCEED

A. Work will not commence until the written Notice-to-Proceed is issued by the State with certification from the Consultant that the work will be completed within the allotted time.

2 PROJECT COORDINATION

A. Routine Working Contact

The routine working contact will be between the CDOT Project Manager (CDOT/PM) and the Consultant Project Manager (C/PM) as defined in Appendix C.

B. Project Manager Requirements

Each Project Manager will provide the others with the following:

a. A written synopsis or copy of their respective contacts (both by telephone and in person) with others.

b. Copies of pertinent written communications.

3 ROUTINE REPORTING AND BILLING

The Consultant will provide the following on a routine basis:

A. Coordination

Coordination of all contract activities by the C/PM

B. Periodic Reports and Billings

The periodic reports and billings required by CDOT Procedural Directive 400.2 (Monitoring Consultant Contracts).

C. Minutes of all Meetings:

The minutes will be completed and provided to the CDOT/PM within five (5) working days after the meeting. When a definable task is discussed during a meeting, the minutes will identify the "Action Item", the party responsible for accomplishing it, and the proposed completion date.

D. General Reports and Submittals

In general, all reports and submittals must be approved by CDOT prior to their content being utilized in follow-up work effort.

4 PERSONNEL QUALIFICATIONS

The Consultant Project Manager (C/PM) must be approved by the CDOT Contract Administrator. Certain tasks must be done by Licensed Professional Engineers (PE) or Professional Land Surveyors (PLS) who are registered with the Colorado State Board of Registration for Professional Engineers and Land Surveyors.

5 CDOT COMPUTER/SOFTWARE INFORMATION

The consultant shall utilize the most recent CDOT adopted software. The primary software used by CDOT is as follows:

A.	Earthwork	InRoads
B.	Drafting/CADD	InRoads and Microstation with CDOT's formatting configurations and standards.
C.	Survey	CDOT Inroads TMOSS
D.	Geometry	CDOT COGO (Coordinate Geometry)
E.	Bridge	Staff Bridge software shall be used in either design or design check
F.	Estimating	Transport (an ASHTO sponsored software)
G.	Specifications	Microsoft Word
H.	Scheduling	Microsoft Project

6 COMPUTER DATA COMPATIBILITY

CDOT presently utilizes a data format which Consultants shall be required to use for submitting survey, photogrammetry and the design data: InRoads & MicroStation using the most current version of the CDOT configuration for this software.

The data format used by the Consultant to submit surveying and photogrammetric data shall be as determined by the CDOT/PM in coordination with the respective Region PLS. The data format for submitting design computer files shall be compatible with the latest version of the adopted CDOT program. The Consultant shall immediately notify the CDOT/PM if the firm is unable to produce the desired format for any reason and cease work until the problem is resolved. Refer to Table 1, Submittals, for additional information regarding the InRoads and TMOSS formats and the acceptable transmittal media.

7 PROJECT DESIGN DATA AND STANDARDS

A. General:

Appendix A is a list of technical references applicable to CDOT work. The consultant is responsible for ensuring compliance with the latest CDOT adopted version of the listed references. Conflicts in criteria shall be resolved by the CDOT/PM.

B. Specific Design Criteria:

Appendix B is a list of specific project criteria. The list is comprehensive and may include items that are not required for a tasks defined in this scope. The Consultant shall submit proposed any changes to the pertinent criteria to the CDOT/PM at one of the periodic progress meetings prior to initiating design.

C. Construction Materials/Methods:

The materials and methods specified for construction will be selected to minimize the initial construction and long-term maintenance cost to the State of Colorado. Non-typical construction materials and methods must be approved in writing by CDOT.

SECTION 6
ENVIRONMENTAL WORK TASK DESCRIPTIONS
3/21/08

Evaluate environmental impacts as necessary for conformance with the South I-25 Corridor and US 85 Corridor EIS & Record of Decision. Assess environmental impacts related to MS4 requirements, noise mitigation, air quality requirements and lighting, as well as development of the stormwater management plan.

	CDOT/ Other	Consultant

SECTION 7
PRECONSTRUCTION WORK TASK DESCRIPTIONS
3/21/08

This list establishes the consultant's individual task responsibility. The consultant shall maintain the ability to perform all work tasks which are indicated below by an 'X' in the consultant column, in accordance with the forms and conditions contained herein, and the applicable CDOT standards. Selected work tasks shall be assigned only after coordination and consultation with CDOT. The Consultant is also responsible for coordinating the required work schedule for those tasks accomplished by CDOT and other agencies. The Consultant should review this entire section to identify applicable material. Contact the Colorado Department of Transportation/Project Manager (CDOT/PM) if clarification is required (see Section 2.01).

The following activities of communication, consensus building, project team reviews, conceptual design, data gathering, documentation, and formal public notice should be planned by the Consultant and coordinated with the CDOT/PM. The time of their accomplishment will overlap and parallel paths of activity should be planned to finish the development phase in accordance with the shortest possible schedule. The type and number of meetings, documents, etc., will depend on the category and characteristics of the project work. A project plan shall be developed by the Consultant which satisfies the requirements of the project development. This plan must be approved by the Contract Administrator (see Section 2.01) before starting the work.

		CDOT/ Other	Consultant
1	**PROJECT INITIATION AND CONTINUING REQUIREMENTS**		
A.	Initial Project Scoping Meeting	_____	X_____
	Identify scope elements, responsibilities and coordination necessary to complete the work.		
B.	Review applicable environmental documents and requirements	_____	X_____
	Ensure that any mitigation or commitments are addressed.		
C.	Independent design review	_____	X_____
	An independent design review shall be performed on any design accomplished by others that will be used in this project. A report identifying the results of these reviews shall be submitted to the CDOT/PM within one week of the review.		
D.	Develop a Project Schedule and assign tasks	_____	X_____
E.	Identify design criteria.	_____	X_____
	Submit a copy of Appendix B -Specific Design Criteria - h the appropriate items completed.		
F.	Initiate survey	_____	X_____
	Arrange Preliminary Field Survey and/or Aerial Survey. CDOT Form 1217a is an outline of a complete survey request and may be used as a guide for completing the survey plan.		
G.	Obtain necessary Right-of-Entry and permits	_____	X_____
	a Some activities may require work on land not controlled by CDOT. In such cases the Consultant shall obtain the necessary written permission to enter the premises.		

	CDOT/ Other	Consultant

b Included in this written permission will be the names and telephone numbers of persons to contact should notification prior to entry be necessary. These written

c Permissions apply to CDOT personnel as well as Consultant personnel. CDOT Form 730 may be used for this purpose. Signed copies of written permission will be submitted to the CDOT/PM prior to entering private property for survey work.

d Some activities such as materials testing on existing pavement and structures may require a permit. Permits will be obtained and copies submitted to the CDOT/PM.

H. Traffic Control _____ X_____

Consultant field activities that interfere with traffic operations within existing roadways will require control of traffic. The Consultant will plan and provide any required traffic control for the survey, testing, or the design process. Traffic control operations will be in accordance with the MUTCD. The proposed Method for Handling Traffic (MHT) must be submitted to the CDOT/PM. Also, certification of the Traffic Control Supervisor as a Worksite Traffic Supervisor by the American Traffic Safety Services Association (ATSSA) or as a TCS (Traffic Control Supervisor) by the Colorado Contractors Association (CCA) shall be required.

I. Initial Submittals _____ X_____

Submit the following samples to the CDOT/PM for approval:

a An original plan sheet that complies with this scope of work

b Photogrammetric and/or survey data and a drawing or photograph in accordance with the requirements specified in this scope of work.

Note:No original plan sheets or photogrammetric survey work will be accomplished until satisfactory samples have been received and approved by the CDOT/PM.

J. Progress Meetings

a CDOT and Consultant Project Managers X_____ X_____

The managers will meet periodically as required (typically at two-week intervals). These progress meetings will be used to coordinate and track the work effort and resolve problems. The meetings will review the following:

i Activities required to be complete since the last meeting

ii Problems encountered/anticipated and potential solutions

iii Project Schedule Update

iv Action Items

v Coordination required with other agencies

The consultant will provide meeting minutes.

b Structure Review Meeting _____ X_____

While the major structural design work is progressing, the Consultant shall meet periodically with the CDOT Structure Reviewer to review the work. These meetings

	CDOT/ Other	Consultant

may be in addition to, or in conjunction with, the Project Progress Meetings. The complexity of the structure shall be considered by the CDOT Structure Reviewer to determine the frequency of review meetings. Other required meetings are described in subsequent sections.

K. Project Management _____ X_____

The Consultant will coordinate all the work tasks being accomplished by all parties to ensure project work completion stages are on schedule.

L. Project Meeting Minutes _____ X_____

Project Meeting Minutes shall be completed and provided to the CDOT Project Manager within one week of the actual meeting

2 PROJECT DEVELOPMENT

A. Communication and Consensus Building _____ X_____

a Contact List _____ X_____

Establish and maintain a computerized list of all appropriate interested parties for the communication process. The list will be used for notices regarding public meetings, mailings, newsletters, or other communication as appropriate.

i The information on the list shall include as a minimum:

A Name

B firm (if any)

C Mailing/E-mail address

D Phone/Fax number

ii The contacts will be compiled from the list below and as supplemented by the Project Team, and the attendees at public meetings.

A Public Agencies

B Elected/Appointed Officials

C Neighborhood Groups

D Property Owners/Tenants

E Business Interests

F Special Interests

G Railroads

H Media Contacts

B. Public Notices/Advertisement _____ X_____

Publicize the proposed project in accordance with the CDOT policies and procedures. Copies of the publication shall also be mailed to the individuals on the “contact list”.

	CDOT/ Other	Consultant

Information obtained from small group and general public meetings shall be used in the project development process.

a Meetings

The types and number of meetings shall be flexible and determined by an interactive process as approved by the CDOT/PM. Minutes of these meetings shall be provided to the CDOT/PM and all participants.

i Small Group Meetings (one-on-one) _____ X_____

Meet with property and business owners or others directly affected by the project work to identify likely impacts and discuss possible mitigation or resolutions.

ii General Public Meetings (informal and workshops) _____ X_____

The format of these meetings will be dictated by the project and goals for the meetings. These meetings may be used to establish communications with the public, add to the "contact list", and gather information regarding local concerns. The meetings may also take the form of a work session or workshop with the affected parties.

iii Progress Review Meetings _____ X_____

These meetings are intended to disseminate project progress information to the public and representatives of local entities. Notices will be mailed at least 14 days in advance of these meetings to those on the "contact list". The Consultant will provide the presentation aids, and help conduct the meeting.

b Communication Aids

i Graphics Support _____ X_____

Provide the graphics for presentations and project documents. This may include slides, overhead projector slides, maps and plan views of conceptual design, computerized presentations and other displays for visual presentations at meetings.

ii Newsletter _____ X_____

A newsletter which will contain project progress information and announcements will be published at the specified interval and will be distributed to those on the "contact list" specified by the CDOT/PM.

iii Local Office _____ X
Obtain and maintain an office within the project area to conduct small group meetings and provide displays/information to the public.

C. Survey

Surveys will be conducted in accordance with the CDOT Survey Manual, the latest addendum thereof, applicable state statutes, and the requirements described in Appendix D

a Presurvey Conference _____ X_____

		CDOT/ Other	Consultant
	A presurvey conference shall be held as per CDOT Survey Manual. The consultant shall attend the Presurvey conference prior to any right of way or survey work		
b	Survey Data Research.	_____	X_____
	Research shall be done as per CDOT Survey Manual and the CDOT Right-of-Way Manual. CDOT will provide existing ROW plans and ROW monument tabulations.		
c	Secure Rights of Entry	_____	X_____
	Follow procedures in the CDOT Survey Manual.		
d	Project Control Survey:	_____	X_____
	i		
	ii Locate or Establish HARN Stations	_____	X_____
	Project control shall be tied to the nearest Colorado High Accuracy Reference Network Station (HARN). In the event there are no HARN stations within 3 miles of the project (Order B, 1:1,000,000 accuracy), or HARN Densification (Order B-2, 1:500,000 accuracy), additional HARN Densification stations shall be set. NGS Blue Book procedures shall be followed for all HARN Densification stations. This will include proper spacing using proper monumentation, equipment, observation procedures, coordination through the Colorado State Geodetic Advisor and submission to NGS for inclusion in the National Database.		
	iii Monumentation	_____	X_____
	Materials will be supplied by CDOT care is to be taken to install said monumentation in locations that are readily usable for the project and in a safe location so that they can be utilized throughout construction (no monumentation shall be set on or near the centerline of the proposed roadway).		
	iv Local Project Control	_____	X_____
	Survey the required project control (centerline/baselines and elevation reference) as required. Prepare a control survey diagram showing graphical representation of all monuments used for control. Tabulate coordinates and physical descriptions of all found monuments and other physical evidence.		
e	Land Survey/Boundary Survey	_____	X_____
	Tie aliquot, property and other land monuments to the control survey. Prepare a Land Survey Control Diagram showing graphical representation of all found aliquot, property and land monuments and their relationship to the project control. Tabulate the coordinates and physical description of all found monuments and other physical evidence.		
f	TMOSS (Topographic) Survey	_____	X_____
	Collect the data required to produce a planimetric map and submit in InRoadsTMOSS format. Features located will include, but not be limited to signs, mailboxes, fences, driveways, curb cuts, curbs, sidewalks, and edges of pavements.		

		CDOT/ Other	Consultant
	Horizontal accuracy shall be as specified in the CDOT Survey Manual for a CDOT class C or D TMOSS survey.		
g	Terrain (Relief or Elevation) Survey	_____	X_____
	Collect elevation data and submit in TMOSS format. Natural ground elevations shall be as specified in the CDOT Survey Manual.		
h	Utility Survey	_____	X_____
	Locate utility poles, manholes, valves, pedestals, guy wires, and other visible utility features. Survey underground utilities as marked by the utility companies. Determine invert elevations of manholes and vaults and survey the locations of utilities exposed by "potholing".		
i	Hydraulic Survey	_____	X_____
	Locate culverts, storm sewer pipes, inlets, vaults, manholes and determine invert elevations. Locate inlets and determine invert elevation of pipes. Accomplish drainage situation surveys for designated culverts and bridges.		
j	Material Sources	_____	X_____
	Survey designated material sources as specified.		
k	Supplemental Surveying:	_____	X_____
	As required and specifically requested.		
l	Survey Report:	_____	X_____
	Prepare a Survey Report as required in the Survey Manual.		
m	Photogrammetry:	_____	N/A____
	i Camera Calibration Report	_____	N/A____
	ii Flight Plan	_____	N/A____
	iii Flight	_____	N/A____
	iv Contact Prints	_____	N/A____
	v Negatives	_____	N/A____
	vi Enlargements	_____	N/A____
	vii Photo Index	_____	N/A____
	viii Supplemental Survey (wing points)	_____	N/A____
	ix Data Reduction	_____	N/A____
	A Topographic Contours		
	B Planimetric (Topography)		
	x Map Compilation	_____	N/A____

	CDOT/ Other	Consultant
A Index Maps		
B Finished Maps		
n Accuracy Tests:	_____	X_____
Adequate measures shall be taken to ensure that equipment is properly calibrated at all times and that proper procedures are used to reduce errors in the data.		
o Review by Professional Land Surveyor	_____	X_____
The accuracy tests are to be reviewed by the PLS in responsible charge for the project, and submitted to the project engineer and made part of the project records. Further review of all aspects of the field and office work shall also be the responsibility of the PLS in responsible charge.		

Note: The completed survey shall be reviewed by the Region survey unit. Two weeks should be provided in the schedule to complete the review and sufficient time should be provided to address all comments provided by this review. Design shall not proceed until all comments resulting from this review have been satisfactorily addressed.

Note: This section of the scope of work applies after the environmental clearance document and clearances have been completed. The consultant will obtain and review the applicable environmental clearance documentation (Cat. Ex., EA, EIS) and ensure that all of the commitments within the document are implemented in the design package. This includes but is not limited to the following:

Noise, Air Quality, Alternate Modes, Archaeology, Paleontology, Hydraulics, Hydrology, Water Quality, Ecological Assessment, Historical, Floodplains, Wetlands, ROW, 4f/6f, As well as the following: Threatened and Endangered Species, Hazardous Materials, Traffic and Safety, Environmental Justice and cumulative and indirect impacts.

Note: The following requirements for the listed categories "a" through "s" may have been completed in the environmental phase of the project. This list includes those items which require additional refinement or additional study not completed in the Cat. Ex., EA., or EIS.

D. Gathering Data, Analysis, and Mitigation Development	_____	X_____
a Traffic Related:	_____	X_____
i Traffic Study.	_____	X_____
A Obtain the necessary data and perform the necessary traffic counts (including percentage of trucks, directional split and turning movements) and produce traffic projections for the design year in accordance with generally accepted procedures.		
B The consultant is required to request the appropriate safety document through the CDOT/PM and incorporate the recommendations into the project design.		
b Noise Study:	_____	X_____
Prepare a noise assessment analysis in accordance with FHWA noise impact regulations. As a minimum, this activity will consist of the following:		
i Predict or measure present noise levels.	_____	X_____

			CDOT/ Other	Consultant
	ii	Analyze noise levels for all concepts. Noise level models will be made with CDOT's noise computer model or as otherwise approved. Distances at which noise levels exceed acceptable levels will be determined for each concept and plotted on corridor maps.	_____	X_____
	iii	Identify locations where noise abatement measures are needed, and determine which measure is feasible and cost effective.	_____	X_____
	iv	Prepare noise assessment report for approval by CDOT.	_____	X_____
c	Air Quality:		_____	X_____
	i	Air Quality Monitoring.	_____	X_____
		Monitor the air quality including but not limited to particulates, carbon monoxide (during the months of December and January) and ozone (during July and August), to obtain the required data.		
	ii	Air Quality Analysis.	_____	X_____
		Prepare an air quality report and submit it to CDOT for approval.		
	iii	Alternative Transportation Systems.	_____	X_____
		Evaluate the effect of other transportation systems on the proposed concepts when required, including but not limited to alternative modes, TDM (Traffic Demand Modeling) and TSM (Traffic Systems Management).		
d	Archaeology		X_____	X_____
	i	Gather Data and Analyze	X_____	_____
		A Conduct a field survey and test excavations as specified.		
		B Complete a laboratory analysis of the diagnostic specimens.		
		C Write the archaeology survey report to recount the analysis of artifacts and describe the culture and importance.		
		D Develop and write the archaeology mitigation plan.		
		E Coordinate the plan with the State Historic Preservation Office (SHPO) and other agencies as required (via the Region Environmental Manager).		
	ii	Mitigation Implementation	_____	X_____
		A Coordinate activities with the designated agencies		
		B Excavate the site		
		C Analyze artifacts		
		D Finalize and submit an archaeology survey report which describes the culture and importance of the artifacts.		
e	Paleontology		X_____	X_____
	i	Gather Data and Analyze	X_____	_____

			CDOT/ Other	Consultant
		A Determine if paleontologic resources are present within the project site.		
		B Conduct a field survey.		
		C Conduct a literature survey.		
		D If any resources are found, conduct an analysis to determine their significance. Determine the potential for additional resources.		
		E Write a preliminary paleontology report.		
		F Develop the paleontology mitigation report and coordinate with FHWA.		
	ii	Mitigation Implementation	_____	X_____
		A Coordinate activities as required.		
		B Excavate the site.		
		C Analyze the resources.		
		D Prepare and submit the final paleontology report.		
f		Initial Geology Investigation	_____	X_____
		A visual inspection of the project area shall be performed to determine possible geologic impacts on the design concepts under consideration. Impacts such as major rock cuts, unsatisfactory subgrade materials, etc., shall be evaluated.		
g		Water Quality	_____	X_____
	i	Quality Analysis	_____	X_____
		A Determine the impact of the project during and following construction by considering the project location and design concept in relation to existing water resources such as: including streams, rivers, lakes, ponds and aquifers.		
		B Develop a mitigation plan which includes construction and permanent best management practices for erosion control measures.		
		C Identify necessary permits		
	ii	Write the water quality report	_____	X_____
	iii	Quality Monitoring	_____	X_____
		Collect and analyze samples as required.		
	iv	Obtain the water quality baseline data prior to construction	_____	X_____
h		Ecological Assessment	_____	X_____
	i	Coordinate with other state and federal agencies as required	_____	X_____
	ii	Research available data	_____	X_____
	iii	Conduct a field study (work shall be performed between April 15th		

			CDOT/ Other	Consultant
		and November 15th)	_____	X_____
	iv	Investigate the concerns raised by coordinated agencies.	_____	X_____
	v	Write the ecological report.	_____	X_____
i	Historical		_____	X_____
	i	Historical Bridge Clearance	_____	X_____
		A Conduct a literature and records search		
		B Consult with the State Historic Preservation Office via the Region Environmental Manager, FHWA and Staff Historian		
		C Obtain clearance for non-eligible bridges		
	ii	Historical Study and Clearance	_____	X_____
		A Conduct a literature and records search		
		B Consult with the State Historic Preservation Office via the Region Environmental Manager, FHWA, and advisory council.		
		C Determine effects		
		D Develop a mitigation plan		
		E Develop memorandum of understanding.		
		F Write the cultural resources report.		
j	Floodplain and Drainage Assessment		_____	X_____
	i	Determine the probable impacts of the project with respect to flood plain and drainage.	_____	X_____
	ii	Develop possible mitigating actions for the adverse impacts	_____	X_____.
		Analyze the impacts and mitigations. Included in the analysis shall be a determination of significant impacts due to:		
		A Single community access routes		
		B Significant risk for social or economic losses due to flooding		
		C Alteration of beneficial floodplain values.		
	iii	Complete a written "Floodplain and Drainage Assessment Report"	_____	X_____
		The report includes:		
		A A detailed discussion of the pertinent aspects of the analysis		
		B Identification of the significant floodplain/drainage impacts		
		C Possible practical mitigating actions.		
k	Right-of-Way		_____	X_____

			CDOT/ Other	Consultant
	i	Perform a field inspection of each project alignment	_____	X_____
		Ascertain number of parcels, affected improvements, and possible problem areas (i.e., mobile homes, functional replacements, historical sites, etc.) Try to estimate family sizes on residential relocations.		
	ii	Compile a ROW cost estimate.	_____	X_____
	iii	Prepare a relocation plan.	_____	X_____
	iv	Prepare a property ownership map based on tax records which identifies ownerships	_____	X_____
	v	Prepare a land use map which identifies land usage.	_____	X_____
		The parcel use categories shall utilize appropriate categories including:		
		A Land in public ownership: specific use and responsible agency/jurisdiction		
		B Commercial: retail, wholesale, industrial, other commercial		
		C Residential: single or multi-family		
		D Vacant		
		E Mixed Uses		
		F Other (specific)		
	vi	Review the impacts on existing and future land use.	_____	X_____
l	4(f)/6(f) Activity		_____	X_____
	Determine and evaluate project impacts on 4(f)/6(f) properties. Include a cost analysis with minimization and avoidance alternatives		_____	X_____
	i	Prepare the applications for 4(f) clearance and 6(f) concurrence.	_____	X_____
		Coordinate with affected agencies (e.g. HUD, US Forest Service, Dept. of Interior, Local Governments. Etc).		
	ii	Prepare and coordinate determination with FHWA	_____	X_____
	iii	Write 4(f)/6(f) mitigation report.	_____	X_____
m	Threatened and/or Endangered Species(T/E)		_____	X_____
	i	Determine the presence of Threatened and/or Endangered Species on the site.	_____	X_____
		A Write findings letter to Division of Wildlife.		
		B Coordinate with FHWA and USFWS		
		C Prepare the Threatened and/or Endangered Species assessment.		
	ii	Prepare and provide the T/E mitigation plan.	_____	X_____

		CDOT/ Other	Consultant
n	Wetlands		
i	Wetlands Determination	_____	X_____
	A Conduct a field evaluation for the presence of wetlands.		
	B Prepare a wetlands map which identifies the wetland boundaries within the project corridor of each alignment.		
	C Coordinate the findings with other agencies as directed by CDOT.		
ii	Wetlands Findings Report	_____	X_____
o	Hazardous Materials	_____	X_____
i	Conduct a field survey of project area.	_____	X_____
ii	Research	_____	X_____
	Conduct a records search for possible hazardous waste using but any or all of the following:	_____	X_____
	A Lists compiled by EPA or Colorado Department of Public Health and Environment (CDPHE) which identify:		
	a Hazardous waste generators		
	b Hazardous water treatment/storage/disposal facilities (current and closed)		
	c Hazardous waste transporters		
	d Locations of underground storage tanks		
	e Known suspected or abandoned hazardous waste sites		
	B Records kept by EPA or CDPHE on violations or citations.		
	C Lists kept by the appropriate FIRe department on:		
	a Underground storage tank locations		
	b HAZMAT incidents/accidents		
	c Local emergency planning/hazardous materials use reporting		
	D Available historic tax records which indicate past land use (coordinate with property ownership and land use data research)		
	E Available historic aerial photos of the corridor (e.g., USGS, Public Library, etc.)		
	F Any pertinent records maintained by CDOT		
iii	Conduct in-situ tests:	_____	X_____
	A Select locations for soil boring/monitoring wells based on information obtained above, geologic review and alignment considerations.		

		CDOT/ Other	Consultant
	B Install monitoring wells and obtain soil and water samples for chemical analysis as well as geotechnical and geologic data.		
	iv Analyze results of chemical analyses and records review and identify potential impacts to the construction from hazardous waste. Assess potential hazards to the public and construction workers and develop potential mitigation options.		
p	Existing Roadway and Major Structures.	_____	X_____
	Evaluate existing conditions to assess the proposed design relative to the following:		
	i Roadway and structure condition	_____	X_____
	ii Geometry	_____	X_____
	iii Lighting	_____	X_____
	iv Traffic signal devices	_____	X_____
q	Construction Requirements:	_____	X_____
	Analyze/investigate the following:		
	i General construction impact (of temporary nature)	_____	X_____
	ii Noise impacts and mitigation	_____	X_____
	iii Material pits	_____	X_____
	iv Haul roads	_____	X_____
r	Aesthetic Considerations:	_____	X_____
	When specified, the following will be investigated:		
	i Wild and scenic rivers	_____	X_____
	ii Natural areas and trails	_____	X_____
	iii Scenic roads and parkways	_____	X_____
	iv Overall visual qualities of this project area	_____	X_____
s	Utilities	_____	X_____
	When specified, the effect on utilities will be investigated. Work with the Region Utilities Engineer to collect the utility location maps for all utilities in the area.		

	CDOT/ Other	Consultant

Note: The scope user should include the following wording in consultant contracts for all Federal-aid highway projects on the National Highway System (NHS) with an estimated cost of $25 million or more (includes environmental studies, preliminary engineering, final design, right-of-way, and construction costs), per 23CFR Part 627. It can also be used on other projects when there is a high potential for significant ratio of savings to study cost, or substantial improvements in project or program effectiveness. User should remove this "usage" text before incorporation into the final scope of work.

Value Engineering (VE) STUDY

A team of transportation design and construction experts will perform a Value Engineering (VE) study. The VE study will be conducted early enough in the project development process to allow evaluation and incorporation of VE recommendations in the NEPA document or design process, as appropriate.	_____	N/A____
The VE study shall be performed in accordance with Federal Highway Administration's (FHWA) guidelines and recognized techniques, and will identify possible alternatives that may save the project cost, time or other resources. An individual with prior experience and certification in facilitating VE studies (the VE facilitator) shall conduct each VE session. It is strongly recommended that VE facilitators be qualified VE practitioners, experienced in performing and leading VE studies (have participated in several VE studies as a team member and several as a team leader), and have sufficient VE training, education, and experience to be recognized by the Society of American Value Engineers (SAVE) International as meeting the requirements for certification.	_____	N/A____
The VE team will consist of individuals with no prior exposure to the project in order to ensure that their comments are fair and unbiased. Individuals that have some familiarity and history with the project may provide briefings to the team. Consultants or firms should not conduct studies of their own designs unless they maintain distinct organizational separation of their VE and design sections. At the direction of the CDOT/PM, the VE team will be assembled to review the Conceptual,. Background information and plans shall be provided to the team at least three weeks in advance of VE sessions. The VE facilitator will coordinate the study with CDOT, appropriate entities, and FHWA.	_____	N/A____
The VE review team will formally evaluate each VE recommendation, and sufficient justification will be made for the acceptance or rejection of each. The VE facilitator will produce a document that summarizes the results, as well as the project elements investigated	_____	N/A____.
The Consultant/PM shall prepare a written response detailing which recommendations were not included, the reasons for exclusion, and how all approved VE results will be incorporated into subsequent engineering efforts. These responses shall be forwarded to the CDOT/PM for distribution to the CDOT Region Transportation Director, FHWA, and other appropriate entities. All approved VE proposals shall be incorporated into the final design plans	_____	N/A____

	CDOT/ Other	Consultant

3 PRELIMINARY DESIGN

A. Traffic Engineering

		CDOT/ Other	Consultant
a	Review locations with "potential for accident reduction map" and or traffic operations analysis and or the safety assessment report. As provided by CDOT to determine which safety improvements will be incorporated into the project.	_____	X_____
b	Analyze the proposed project design with the traffic projection data	_____	X_____
c	Recommend the appropriate geometry (i.e., number of lanes, auxiliary lanes, storage lengths, weaving distances, etc.) In accordance with the current or most recent version of Highway Capacity Manual.	X_____	X_____
d	The proposed design shall be reviewed to ensure compatibility with existing signing procedures throughout the preliminary roadway design process	_____	X_____
e	Use traffic data appropriate to the anticipated construction timing in developing detour alternatives.	_____	X_____
f	Develop the total ESAL for the design life and submit to the CDOT/PM for the pavement design.	_____	X_____
g	Submit the traffic data and recommendations to the CDOT/PM for review.	_____	X_____

B. Materials Engineering

		CDOT/ Other	Consultant
a	Preliminary Soil Investigation	_____	X_____
i	Determine test hole locations (horizontal and vertical) and coordinate with the CDOT/PM.	_____	X_____
ii	Collect soil samples and test for:	_____	X_____

A Classification

B Moisture – Density Relationship

C Resistance Value

D Corrosiveness

a *Note locations of high corrosiveness with recommendations*

E Bearing Capacity

iii	Prepare and submit a soils investigation report.	_____	X_____

C. Pavement

a	Pavement Rehabilitation	_____	X_____

This section applies if the project includes existing pavement that is incorporated in the design for continued utilization.

		CDOT/ Other	Consultant
i	Determine the equivalent Design Traffic (18k ESAL) that the existing pavement can carry	_____	X_____
ii	Estimate the 18k ESAL's experienced by the existing pavement.	_____	X_____
iii	Obtain the projected 18k ESAL for rehabilitated pavement design period.	_____	X_____
iv	Perform a distress survey	_____	X_____
	A Determine the types of distress present in the pavement		
	B Determine the extent of each distress type		
	C Develop a distress map for the existing pavement		
	D Determine the causes of the existing distress utilizing tests and required and analyses.		
	E Determine the drainage conditions of the existing surface and subsurface		
v	Investigate the existing pavement structure	_____	X_____
	A Subgrade: soil classifications, moisture/density relationship, resistance value and corrosiveness		
	B Base: thickness, gradation, plasticity index, liquid limit, resistance value, strength coefficient		
	C Pavement: thickness, strength coefficient		
vi	Perform deflection testing to obtain the following:	_____	X_____
	A Deflection profile		
	B Maximum deflection		
	C Deflection basin		
	D Differential deflections at transverse joints for portland cement concrete pavement (pccp)		
	E In place determination of the appropriate modulus for each layer and subgrade		
vii	Determine the remaining load carrying capacity from the above data.	_____	X_____
viii	Design the feasible alternatives for the required rehabilitation (and widening if appropriate) utilizing the above investigations and test results.	_____	X_____
	The design of the feasible alternatives shall be checked against the following:	_____	X_____
	A The basic cause of distress which shall be corrected		
	B Effect on the rate of future deterioration		
	C Effect on surface characteristics		
	Where appropriate, any new pavement widening shall be included in the analysis		
b	New Pavement Structure	_____	X_____
	The feasible alternatives of new pavement structure shall be designed utilizing procedures accepted by the CDOT/PM. New pavement designs for widening shall be compatible with adjacent rehabilitated existing pavement.		

		CDOT/ Other	Consultant
c	Pavement Justification	_____	X_____
i	Basic factors:	_____	X_____
	A Desired life expectancy (obtain design life from CDOT). *B Required maintenance activities intervals.* *C Basis for performance life.*		
ii	Analyze life cycle cost of the selected alternatives	_____	X_____
	A Perform analysis with unit and maintenance costs from CDOT. Determine present worth and annual costs in accordance with the procedures in the CDOT Pavement Design Guide. *B Compare alternatives over the same life span.* *C Recommend the pavement structure and provide the basis for the recommendations.*		
d	Pavement Design Report	_____	X_____
	Include all the above tests, investigations, analyses, and calculations performed as a result of this section. Submit to the CDOT/PM for acceptance.		
D.	Structures		
a	Existing bridge condition investigation	_____	X_____
	Determine condition of existing bridge deck, superstructure and substructure material as required.		
b	Foundation Investigation Report	_____	X_____
i	Prepare a Foundation Investigation Request showing requested test hole locations.	_____	X_____
ii	Formulate drilling pattern, perform the necessary subsurface investigation and collect samples as required.	_____	X_____
iii	Perform the appropriate laboratory tests and analyze the data. Determine strength, allowable bearing capacity and corrosiveness of foundation material.	_____	X_____
iv	Perform lateral analyses (deformation, moment, and shear) for the caissons and/or piles which are subjected to lateral loadings. This may be a computer analysis which will consider the group effect and selection of the soil parameters.	_____	X_____
v	If appropriate, a pile driving analysis using a wave equation will be accomplished.	_____	X_____
vi	Submit the Foundation Investigation Report to the CDOT/PM for approval.	_____	X_____
vii	Prepare engineering geology plan sheet and copies of the Foundation Investigation Report foundation report with recommendations for type, size, and tip (bottom) elevation of the required foundation. Specify if pre-drilling, pile tip, casing, dewatering, etc., are needed for foundation construction.	_____	X_____

	CDOT/ Other	Consultant
E. Hydrology/Hydraulic Engineering	_____	X_____
a Hydrology	_____	X_____
i Establish drainage basin data: delineate, determine size, waterway geometrics, vegetation cover, land use.	_____	X_____
ii Collect historical data; research flood history and previous designs in the project proximity; and obtain data from other sources (e.g., Urban Drainage & Flood Control District, Colorado Water Conservation, CDOT Maintenance, and local residents).	_____	X_____
iii Select a storm frequency based on the CDOT Hydraulic (Drainage) Design Guide criteria.	_____	X_____
iv Do a hydrological analysis using existing studies or approved methods (see CDOT Drainage Design Manual)?	_____	X_____
v Perform a risk analysis.	_____	X_____
b Hydraulics	_____	X_____
i Accomplish the preliminary design of minor drainage structures:	_____	X_____
A Determine location and crossing alignment. Identify channel centerline by highway station or coordinates, as appropriate		
B Determine the allowable headwater.		
C Assess the degree of sediment and debris problems to be encountered, including abrasion and corrosion.		
D Type, size, shape and material of the structures.		
E Prepare preliminary structure cross-sections to determine the elevations, flow lines, slopes and lengths of the structures. Show the flow quantity on the sections		
F Complete the design computations and documentation in accordance with the CDOT Drainage Design Manual.		
G Determine high water level.		
ii A water surface profile and complete hydraulic analysis is required for major structures. Determine the following:	_____	X_____
A Water surface profile and hydraulic analysis		
B Required hydraulic size and skew of the bridge		
C Minimum low girder elevation using CDOT Drainage Design Manual criteria		
D The design year frequency		
E The design year and 500 year high water elevations		
F Predicted total scour profile for design year and 500 year scour		

	CDOT/ Other	Consultant

G The channel erosion protection for structures

iii If required, identify and assist CDOT in coordinating any required potential funding participation of local municipalities or agencies. _____ X_____

iv Recommend culvert pipe sizes, type, shape and material for proposed detours. _____ X_____

c Storm Water Management Plan _____ X_____

i Initiate a Storm Water Management Plan in accordance with:

A Municipal Separate Storm Sewer Systems (MS4)

B CDOT's Erosion Control and Storm Water Quality Guide

C CDOT's Standard Specifications

D CDOT Standard Plans

E Other appropriate documents

d Preliminary Hydraulics and Hydrology Report. Include the following: _____ X_____

A Hydrology analysis
B Minor structure hydraulic designs
C Major structure hydraulic designs
D Detour hydraulic designs
E Structure cross-sections
F Storm Water Management Plan
G Appendix:

a Drainage basin maps

b Hydrology/hydraulic worksheets

F. Utility Coordination

a Location Maps _____ X_____

Obtain utility location maps from the Utility Companies which identify utility features in the project area. Requests and receipt of maps will be coordinated with the Region Utility Engineer via copies of request and transmittal letters.

b Reviews and Investigations _____ X_____

Conduct field reviews and utility investigations with the Region Utility Engineer and Utility companies, as required, to ensure correct horizontal and vertical utility data. When possible this will be done utilizing non-destructive investigative techniques. The horizontal and vertical locations will be shown in the FIR plans and cross sections.

When "potholing" is required, the Consultant shall be responsible for the excavation _____ X_____

c Surveying Utility Locations _____ X_____

		CDOT/ Other	Consultant
d	Relocation Recommendations	_____	X_____
	Submit necessary information for the relocation or adjustments of affected utilities to the Region Utility Engineer. The Region Utility Engineer will process the required agreements.		
e	Ditch Company Coordination	_____	X_____
	Contact ditch companies through the Region Utility Engineer to coordinate ditch requirements and restrictions. Develop the plans for the necessary irrigation structures and submit to the Region Utility Engineer for Ditch Company review.		
G.	Roadway Design and Roadside Development		
	Coordinate all design activities with required CDOT specialty units and other outside entities.		
a	Roadway Design	X_____	X_____
i	Check and plot survey data	X_____	X_____
ii	Verify that a project specific coordinate system approved by CDOT is used to identify the horizontal locations of key points. The coordinate systems used for roadway design and ROW shall be compatible.	X_____	X_____
iii	Check horizontal and vertical alignments against all design criteria. Necessary variances and/or design decisions will be identified with justification and concurrence by CDOT & FHWA.	X_____	X_____
iv	Provide alignments, toes of slope and pertinent design features, including permanent and temporary impacts, to the ROW, Utility and Environmental Managers.	X_____	X_____
v	Plot/develop all required information on the plans in accordance with all applicable CDOT policies and procedures	X_____	X_____.
X			
vi	Using current approved CDOT software, generate a 3 dimensional design model and produce preliminary quantities	X_____	X_____
b	Roadside Development:	X_____	X_____
	For roadside items including but not limited to, guardrails, delineators, landscaping, sprinkler systems, sound barriers, bike paths, sidewalks, lighting, curb ramps, truck escape ramps, and rest areas provide the following:	X_____	X_____
i	Layouts in the plans		
ii	Critical locations in the plans for irrigation sleeves and other utility conduits underneath the proposed roadways.		
iii	Coordinate the roadside items with the Storm Water Management Plan (SWMP).		
H.	Right-of-Way.	X_____	X_____

			CDOT/ Other	Consultant
	The following work shall be done by, or under the immediate supervision of, a Professional Land Surveyor (PLS). The following work may be included as part of a Surveying contract or part of a Right-of-Way plans preparation contract.			
a	Research		_____	X_____
	i	Identify affected ownership from preliminary design plans	_____	X_____
	ii	Obtain assessor's maps for the project	_____	X_____
	iii	Locate documents which transfer title.	_____	X_____
	iv	Prepare chain of title as directed by the CDOT ROW Manual or as directed by the CDOT Project Manager.	_____	X_____
	v	Look for encumbrances, liens, releases, etc.	_____	X_____
	vi	Make physical inspection of property. Note any physical evidence of apparent easements, wells, ditches, ingress, and egress.	_____	X_____
	vii	Check with local entities such as the County Road Department or County Engineer for location of existing roads or easements.	_____	X_____
	viii	Check for and obtain latest subdivision plats and vacations of streets.		
b	Ownership Map		_____	X_____
	For additional detail on required drafting software, see Section 8 Submittals. Project coordinate system ownership map shall be submitted along with a "Project Narrative".		_____	X_____
	i	Review preliminary design and survey report	_____	X_____.
	ii	Review project coordinate system and basis of bearing from Control Survey prior to calculations.	_____	X_____
	iii	Compute alignment of ROW centerline and store coordinates of all found monuments within the FIRst tier of properties left and right of Centerline.		
	iv	Review ownership documents (Memoranda of Ownership and/or title commitments, deeds and supporting plats).	_____	X_____
	v	Calculate coordinates of lost or obliterated aliquot corners using guidelines established by the Bureau of Land Management. (To be used in resetting corners according to Colorado Revised Statutes).	_____	X_____
	vi	Establish subdivisions of sections using Bureau of Land Management Guidelines. Show all section lines and ¼ section lines on the ownership map and ROW plans.	_____	X_____
	vii	Determine existing Right-of-Way limits from deeds of record, CDOT plans and found ROW markers. Previous Right-of-Way plans, if available, will be provided by CDOT as an aid.	_____	X_____

	CDOT/ Other	Consultant
viii Determine ownerships and their property boundary locations. Locate the intersection of these property boundary lines with the existing CDOT Right-of-Way. Determine location and ownership of existing easements of record.	_____	X_____
ix Secure additional property ties and additional topography where the highway improvement may affect improvements adjacent to the Right-of-Way. This additional topography should include:	_____	X_____
A Proximate buildings, sheds, etc.		
B Underground cables and conduits		
C Wells		
D Irrigation ditches and systems		
E Septic tanks, cesspools, and leaching fields		
x Reconcile overlaps and gaps in ownerships as required by CDOT, documenting method used (may require additional field work). Include reasons for decisions in the "Project Narrative".	_____	X_____
xi Plot OWNERSHIP MAP on 22 inch x 34 inch Mylar sheets in accordance with specifications. DOT Form 126-R will be provided by CDOT for this purpose. Normal scale, 1"=400' in rural areas, 1"=200' in urban areas. If entire ownership will not fit on the sheet at this scale, an additional abbreviated OWNERSHIP MAP may be used at a scale of 1"=1 mile, or other suitable scale, to show the configuration of large ownerships. Metric equivalents may be required.	_____	X_____
xii Label all monuments found with description of monument and project coordinates (from Control Survey Diagram).	_____	X_____
xiii Show improvements and topography within the ownerships and existing access to the street/county road system	_____	X_____.
xiv Number ownerships alternately as they occur along the centerline from south to north or west to east in the same direction as the stationing. Show current names of owners and lessees.	_____	X_____
xv Calculate the total area of all ownerships affected, including coordinates of all property corners. Deduct areas for existing road Rights-of-Way. Bearings and distances do not need to be shown on 1" = 1 mile abbreviated OWNERSHIP MAPS.	_____	X_____
xvi Different land uses within a property should be cross-hatched or shaded	_____	X_____.
xvii In the lower right corner of the OWNERSHIP MAP, show seal, number and name of Professional Land Surveyor supervising the work.	_____	X_____
xviii Transmit finished reproducible OWNERSHIP MAP, electronic drawing files, and Memoranda of Ownership to CDOT along with all calculations, field notes, and supporting data. The OWNERSHIP MAP will include a copy of the control and monumentation sheet	_____	X_____

Note that only the project control data needs to be completed at this time.

	CDOT/ Other	Consultant

I. Major Structural Design:

Major structures are bridges and culverts with a total length greater than twenty feet or retaining walls with a total length greater than one hundred feet and a maximum exposed height at any section of over five feet. This length is measured along centerline of roadway for bridges and culverts, and along the top of wall for retaining walls. Overhead sign structures (sign bridges, cantilevers, and butterflies extending over traffic) are also major structures, but are exempt from the structure preliminary design activity defined here. _____ X_____

Major structures shall be designed in accordance with the AASHTO Load Resistance Factor Design (LRFD) Specifications and the CDOT Bridge Design Manual. The CDOT Structure Reviewer will participate in coordinating this activity.

a Structural Data Collection _____ X_____

i Obtain the structure site data. The following data, as applicable, shall be collected: (Typical roadway section, roadway plan and profile sheets showing all alignment data, topography, utilities, preliminary design plan) Right-of-Way restrictions, preliminary hydraulics and geology information, environmental constraints, lighting requirements, guardrail types, recommendations for structure type, and architectural recommendations.

ii Obtain data on existing structures. When applicable, collect items such as existing plans, inspection reports, structure ratings, foundation information, and shop drawings. A field investigation of existing structures will be made with notification to the Resident Engineer.

b Structure Selection and Layout _____ X_____

i Review the structure site data to determine the requirements that will control the structure size, layout, type, and rehabilitation alternatives. On a continuing basis, provide support data and recommendations as necessary to finalize the structure site data.

ii Determine the structure layout alternatives. For bridges, determine the structure length, width, and span configurations that satisfy all horizontal and vertical clearance criteria. For walls, determine the necessary top and bottom of wall profiles.

iii Determine the structure type alternatives. For bridges, consider precast and cast-in-place concrete and steel superstructures and determine the spans and depths for each. For walls, determine the feasible wall types in accordance with the CDOT Bridge Design Manual.

iv Determine the foundation alternatives. Consider piles, drilled caissons, spread footings, and mechanically stabilized earth foundations based on geology information from existing structures and early estimates from the project geologist. To obtain supporting information, initiate the foundation investigation as early as possible during the preliminary design phase.

v Determine the rehabilitation alternatives. Continued use of all or parts of existing structures shall be considered as applicable. The condition of existing structures shall be investigated and reported. Determine the modifications and rehabilitation necessary to use all or parts of existing structures and the associated costs.

	CDOT/ Other	Consultant

vi Develop the staged construction phasing plan, as necessary for traffic control and detours, in conjunction with the parties performing the roadway design and traffic control plan. The impact of staged construction on the structure alternatives shall be considered and reported on.

vii Compute preliminary quantities and preliminary cost estimates as necessary to evaluate and compare the structure layout, type, and rehabilitation alternatives.

viii Evaluate the structure alternatives. Establish the criteria for evaluating and comparing the structure alternatives that, in addition to cost, encompass all aspects of the project's objectives. Based on these criteria, select the optimum structure layout, type, and rehabilitation alternative, as applicable, for recommendation to CDOT.

ix Prepare preliminary general layout for the recommended structure. Prepare structure layouts in accordance with the CDOT Bridge Detailing Manual. Special detail drawings and a detailed preliminary cost estimate shall accompany the general layout. The special detail drawings shall include the architectural treatment. Perform an independent design and detail check of the general layout.

c Structure Selection Report _____ X_____

Prepare a structure selection report to document, and obtain approval for, the structure preliminary design. By means of the structure general layout, with supporting drawings, tables, and discussion, provide for the following:

i Summarize the structure site data used to select and layout the structures. Include the following:

A Existing structure data, including sufficiency rating and whether or not the structure is on the "select list".

B Project site plan

C Roadway vertical and horizontal alignments and cross sections at the structure

D Construction phasing

E Utilities on, below, and adjacent to the structure

F Hydraulics:

Channel size and skew, design year frequency, minimum low girder elevation, design year and 500 year high water elevations, estimated design year and 500 year scour profiles, and channel erosion protection

G Preliminary geology information for structure foundation

H Architectural requirements

ii Report on the structure selection and layout process. Include the following:

	CDOT/ Other	Consultant

A Discuss the structure layout, type, and rehabilitation alternatives considered

B Define the criteria used to evaluate the structure alternatives and how the recommended structure was selected

C Provide a detailed preliminary cost estimate and general layout of the recommended structure

iii Obtain acceptance by CDOT on the recommended structure and its layout.

Allow approximately two weeks for review of the structure selection report. The associated general layout, with the revisions required by the CDOT review, will be included in the FIR plans. The work schedule shall be planned accordingly. The structure selection report, with the associated general layout, must be accepted in writing by CDOT prior to the commencement of further design activities.

d Foundation Investigation Request _____ X_____

Initiate the foundation investigation as early in the preliminary design phase as is practical. On plan sheets showing the project control line, its stations and coordinates, utilities, identify the test holes needed and submit them to the project geologist. The available general layout information for the new structure shall be included in the investigation request.

J. Construction Phasing Plan X_____ X_____

A construction phasing plan shall be developed for all projects which integrates the construction of all the project work elements into a practical and feasible sequence. This plan shall accommodate the existing traffic movements during construction (detours). A preliminary traffic control plan will also be developed which will be compatible with the phasing plan.

K. Preparation for the FIR _____ X_____

a Coordinate, complete, and compile the plan inputs from other branches: materials, hydraulics, traffic, right-of-way, and Staff Bridge.

b If a major structure is included in the project, a general layout (which has been accepted by CDOT) will be included in the FIR plans.

c Prepare the preliminary cost estimate for the work described in the FIR plans base on estimated quantities.

d The FIR plans shall comply with CDOT requirements and shall include: title sheet, typical sections, general notes, plan/profile sheets, and preliminary layouts of interchanges/intersections.

The plan/profile sheets will include the following: all existing topography, survey alignments, projected alignments, profile grades, ground line, existing ROW, rough structure notes (preliminary drainage design notes, including pipes, inlets, ditches and channels), and existing utility locations.

i The following items will be mandatory for the FIR plans:

	CDOT/ Other	Consultant

A Preliminary earthwork (plotted cross sections at critical points with roadway template and existing utility lines at known or estimated depths)

B Catch points

C Proposed Right-of-Way

D Pit data (if required)

E Soil profile and stabilization data

F Structure general layouts (if applicable)

ii Typical plan sheet scales will be as follows:

A	*Plan and Profile*	*1 inch = 50 Feet (Urban)* *1 inch = 100 Feet (Rural)*
B	*Intersections*	*1 inch = 20 feet*

e The ROW ownership map shall be included in the FIR plan set.

f The plans shall be submitted to the CDOT/PM for a preliminary review prior to the FIR.

g The plans will be reproduced by the CONSULTANT.

h The construction phasing and the preliminary traffic control plan with proposed detours will be included in the FIR plan set.

i CDOT form 1048 – project scoping procedures completion checklist

L. Field Inspection Review _____ X_____

a Attend the FIR

b The FIR meeting minutes shall be prepared by the C/PM, approved by the CDOT/PM, and distributed as directed.

c The FIR original plan sheets shall be revised/corrected in accordance with the FIR meeting comments within thirty (30) working days.

d Design decisions concerning questions raised by the FIR will be resolved in cooperation with the CDOT/PM. The C/PM shall document the decision and transmit the documentation to the CDOT/PM for approval.

e A list of all deviations from standard design criteria along with the written justification for each one shall be submitted to the CDOT/PM.

M. Post-FIR Revisions _____ X_____

The Consultant shall complete the revisions required by the FIR before this phase of work is considered to be complete.

	CDOT/ Other	Consultant

4 **FINAL DESIGN**

A. Project Review _____ X_____

a. Update Project Schedule

b. Coordinate Activities

c. Finalize design decisions, variances, justification process, and traffic signal warrants.

B. Roadway Design and Roadside Development X_____ X_____

a. Roadway design. Prepare and provide final roadway design plans incorporating all input from applicable CDOT specialties and outside entities.

b. Roadside design

c. Landscaping _____ X_____

i. Determine most economic alternative, finalize concept, and complete the plan.

ii. Verify that an acceptable safe recovery distance exists between traveled way and all trees to be planted.

iii. Coordinate special permits that may be required.

iv. Verify availability of plant materials and submit letter to the CDOT/PM certifying that designated plants are available.

d. Prepare and provide plans for sprinkler systems, bike paths, sound barriers, truck escape ramps, rest areas, and others, as appropriate.

e. Lighting plans

i. Provide a foundation investigation for each high mast light location.

ii. After approval of the locations of the lights, the lighting design will be completed with the following information shown on the plan sheets:

A. Circuit type and voltage of power source

B. Location of power source (coordinated with the utility engineer)

C. Lumina ire type and lumens

D. Light standard type and mounting height

E. Bracket arm type and length

F. Foundation details

G. Size and location of electrical conduit

H. Locations of power sources(s)/lighting control center(s) (if appropriate)

I. Location of direct burial cable

J. Size of wiring and/or direct burial cable

	CDOT/ Other	Consultant
iii. Coordinate with local entities		
f. Prepare and provide wetland mitigation plan.		
C. Utility Coordination.		
Following the finalization of the roadway horizontal alignment and profile grade and the horizontal and vertical location of drainage structures, sewers, and other underground structures, coordinate with the Utility Engineer to identify and resolve any conflicts to finalize utility clearances.		
a. Prepare and provide final utility plans	_____	X_____
i. The final utility plans shall be prepared following the resolution of the FIR comments, the completion of the final hydraulic design, and the completion of the design of the other items in the list in paragraph (b) below.		
ii. The final utility plans shall include all horizontal and vertical locations of the existing and proposed utilities and any other details which would indicate possible utility conflicts.		
iii. The new or revised utility locations will be added to the plan topography. Conflicts will be resolved and appropriate pay items and specifications added, if required, to adjust utilities.		
b. Final railroad plans		
Coordinate the following activities through the Region Utility Engineer		
i. Develop the railroad encroachment plan (with cross sections) in accordance with railroad requirements.		
ii. Define construction responsibilities between the railroad and highway		
iii. Develop cost estimates based upon cost allocation previously determined		
iv. Prepare Public Utilities Commission application exhibits as required.		
D. Hydraulic Design		
a. Data Review	_____	X_____
Review data and information developed under the Preliminary Hydraulic Investigation and update in accordance with decisions made at the FIR.		
b. Storm Water Management Plan	_____	X_____
i. Update the Storm Water Management Plan in accordance with decisions made at the FIR and on additional investigation since the FIR.		
ii. Identify and incorporate MS4 requirements into the final plans.		
c. Major Structure Channel Design	_____	X_____
The final design shall include:		
i. The configuration, size and skew of the channel(s)		

	CDOT/ Other	Consultant
ii. Water surface elevations		
iii. Elevations, flow lines and hydraulic information		
iv. Channel erosion protection limits for the structure(s)		
v. Recommend a low girder elevation for the selected structure(s)		
vi. Predict scour depth in the channel for the selected structure(s), and recommend mitigation measures		
d. Final Hydraulics Report	_____	X_____
i. Review and update the preliminary hydraulics report and provide 5 copies of the final hydraulics report containing all of the revisions		
ii. Bridge hydraulic information incorporated into the plan sheets		
E. **Right-of-Way Plans and activities - reference the CDOT ROW and surveying manual' requirements for the following:**		
a. Initiate ROW authorization process	_____	X_____
Coordinate with the CDOT/PM to initiate the ROW authorization process. Typically, the corrected FIR plans (with final hydraulic design inputs) will be used as the design basis for the ROW authorization plans.		
b. Ownership Maps	_____	X_____
c. Authorization Plan:	_____	X_____
i. Integrate toes of slopes and other design details such as lane lines, culverts, road approaches, etc. into ownership map (base map for ROW plans).		
ii. Determine new Right-of-Way requirements, access control, and easements from design plans following the FIR and plot on ownership/base maps. Normal scale, 1"=50' in urban areas, 1"=100' in rural areas. Metric units may be required as per PM. Metric scales will be as shown in the CDOT "Metric Conversion Manual". Revise numbering of ownerships to correspond to ROW acquisitions.		
iii. Calculate areas of parcels, easements, and remainders in accordance with CDOT Right-of-Way Manual.		
iv. Prepare ROW plan sheets		
v. Prepare legal descriptions of parcels, easements and access control as directed by the CDOT ROW Manual		
vi. Prepare tabulation of properties sheet		
vii. Prepare Right-of-Way Title Sheet		
viii. Incorporate the Control Survey and Monumentation Sheets into the plans.		
ix. On the Monumentation Sheet, list the Right-of-Way, Easement, Control, etc., points to be set and the aliquot corners to be reset.		

	CDOT/ Other	Consultant
x. Prepare right-of-way tabulation of road approaches, if applicable. Show owner milepost/station, right or left of centerline, width of approach, skew angle, and any remarks.		
xi. Hold ROW Plan Review, with Design, ROW, and Construction to determine if ROW plans are sufficient to proceed with appraisal of property to be acquired for the project.		
xii. Transmit originals of the plan sheets, title sheet, tabulation of properties sheet, and revised ownership (memoranda of ownership and title commitments as directed by the ROW manager), calculations and supporting data (i.e., parcel diaries), and final electronic data for all work products.		
d. Right-of-Way Plan Revisions	_____	X_____
Revise the Right-of Way plans as needed through out the appraisal and negotiation process for those changes approved by the Region Right-of-Way Supervisor. All plan revisions shall be submitted to the Region Right-of-Way Supervisor within 5 working days after receiving notice from CDOT to proceed with a Plan Revision.		
e. Final ROW plans and monumentation	_____	X_____
i. ROW Plan Review	_____	X_____
ii. ROW Plan Revisions, as needed throughout the negotiation and appraisal process.	_____	X_____
f. Appraisals	X_____	_____
g. Appraisal staking	_____	X_____
Stake the proposed ROW line, easements and existing ROW line, if required by the region supervisor. Set lath or wooden stakes at all angle points and on line as necessary to have at least three stakes visible from any point on line. Mark COGO point numbers on all stakes and color code per CDOT Survey Manual. The appraisal stakes only need to be set at an accuracy of +/- 1.0 foot, unless the point fall near improvements, then +/- 0.25 foot is necessary.		
h. Title Insurance and Closing Services	X_____	_____
Provide title insurance and closing services as described in the CDOT ROW Manual and coordinate with the CDOT Region ROW Manager.		
i. Acquire needed parcels including title insurance and closing services coordinated with the Region ROW Manager	X_____	_____
F. Materials Engineering	_____	X_____
a. Finalize and provide the stabilization plan/pavement design report.	_____	X_____
b. Finalize geotechnical considerations and incorporate them into the plans.	_____	X_____
i. Rock fall ii. Rock cut iii. Landslides iv. Other		

	CDOT/ Other	Consultant
G. Traffic Engineering	_____	X_____
a. Prepare and provide permanent signing/pavement marking plans		
b. Signalized intersections:	_____	X_____
i. Prepare and provide the signal warrant study	_____	X_____
ii. Prepare plan sheet with intersection condition diagrams and required traffic signal design and forward to appropriate agency. Prepare 1 inch to 20 foot scale intersection plan sheet for each intersection which will have a traffic signal designed for it.	_____	X_____
c. Prepare and provide the construction traffic control plans and quantities	_____	X_____
H. Final Major Structural Design		
During the conduct of this activity the Consultant shall participate in structural review meetings with the CDOT Structural Reviewer. The design shall be in accordance with the AASHTO LRFD and the CDOT Bridge Design Manual.		
a. Structure final design	_____	X_____
i. Perform the structural analysis. Provide superstructure design, substructure design and document the design with design notes, detail notes, and computer outputs.		
ii. Perform final design check from design and detail notes.		
b. Preparation of structure plans and specifications	_____	X_____
Prepare and provide the Structural Plans and Specifications, including any revisions identified during the independent check.		
c. Independent design, detail and quantity check	_____	X_____
d. Prepare and provide the bridge rating and field packages	_____	X_____
I. Construction Phasing Plan	X_____	X_____
A final construction phasing plan will be developed which integrates the construction of all project work elements into a practical and feasible sequence. This plan shall accommodate the existing traffic movements during construction, and a final traffic control plan will be developed which shall be compatible with the phasing plan.		
J. Obtain Permits		
This activity is concurrent with final design and must be completed prior to the advertisement for construction. Coordinate between the agencies, the Region Environmental Manager and the CDOT/PM and prepare and submit application and design information to the Region Environmental Manager for the following permits:		
a. 401 Permit Process (Water Quality Certification)	X_____	X_____
b. 402 Permit Process (Point Source Discharge)	X_____	X_____

	CDOT/ Other	Consultant
c. 404 Permit Process (Individual Dredge and Fill)	X_____	X_____
i. Determine impacts		
ii. Coordinate with the U.S. Army Corps of Engineers, Region and Staff Design		
iii. Incorporate permit stipulations into the final plans		
d. Wildlife Certification	X_____	X_____
e. NPDES Storm Water Permit for Construction Activities	X_____	X_____
K. Plan Preparation for the Final Office Review		
a. Coordinate the packaging of the plans	_____	X_____
i. Collect plans from all design elements and collate the plan package. Include all items listed in the Project Development Manual.		
ii. Calculate plan quantities and prepare the tabulations and Summary of Approximate Quantities.		
b. In addition to the plan sheets, the special provisions shall be provided	_____	X_____
This will consist of those unique Project Special Provisions which have to be written specifically for items, details and procedures not adequately covered by CDOT's Standard Specifications and Standard Special Provisions. Also a list of the Standard Special Provisions which are applicable to the project shall be prepared. The Project Special Provisions shall be provided in the CDOT format and submitted with the project plans.		
c. Prepare FOR Estimate.	_____	X_____
Item numbers, descriptions, units and quantities shall be listed and submitted to the CDOT/PM.		
d. Submit the FOR Plans and specifications (Originals) to the CDOT/PM for a preliminary review prior to the FOR.	_____	X_____
e. FOR plan reproduction (_25_) sets	_____	X_____
L. Final Office Review	_____	X_____
a. Attend the FOR		
b. The FOR meeting minutes shall be prepared by the C/PM, Approved by the CDOT/PM, and distributed within two weeks of the meeting as directed.		
c. The FOR original plan sheets and the specifications shall be revised in accordance with the FOR meeting comments and submitted to the CDOT/PM within four (4) weeks after the FOR.		
d. Submit the final revision of the plans after CDOT review.	_____	X_____
M. Construction Plan Package	_____	X_____

	CDOT/ Other	Consultant

The bid plan construction contract package shall consist of the revised FOR plans and will completely describe the work required to build the project including project special provisions and detailed quantities.

a. Electronic and hard copies of the following:

i. Roadway _____ X_____

A. Horizontal and vertical data

B. Staking data

C. Earthwork quantities

D. Mass haul diagram

E. Cross sections

ii. Major structures _____ X_____

An independent set of the following shall be submitted to the CDOT Structural Reviewer for each major structure.

A. Structure grades

B. Structure geometry

b. Final engineering package. The consultant shall submit 5 copies, in 3-ring binders of the following:

i. All project calculations or worksheets _____ X_____

ii. All final reports and their approvals: _____ X_____

Traffic, hydraulics, lighting, pavement design and economic analysis, geology foundation report, etc. All reports will have the latest revisions included.

iii. Copies of variances, design decisions, and variance approvals _____ X_____

iv. Project meeting minutes _____ X_____

v. Utility clearance package _____ X_____

Utility agreements and information regarding the utility location and clearance conditions

vi. Environmental clearances, 404, 401, wetlands, endangered species, etc. _____ X_____

vii. Bridge construction packet _____ X_____

Includes bridge grades, geometry, and quantity calculations or worksheets

viii. Any other information unique to this project and deemed important to the effectiveness of construction.

c. Record plans sets _____ X_____

	CDOT/ Other	Consultant

Two (2) record plan sets for final design of roadways and structures will be produced which shall bear the seal and signature of the responsible Consultant Engineer on each sheet. One (1) set shall be retained by the Consultant for three (3) years. The other set shall be submitted to CDOT. The original plan drawings shall not bear a seal.

5 CORRIDOR MANAGEMENT SUPPORT

A. Design Control

a Provide the required staff, communication equipment and computer systems with appropriate software for tracking and monitoring the planning efforts. _____ X_____

b Conduct periodic corridor progress meetings at an interval acceptable to the CDOT/PM. The following shall be reviewed: _____ X_____

i Activities complete since the last meeting

ii Problems encountered

iii Late activities

iv Activities required by the next progress meeting

v Solutions for unresolved and anticipated problems

vi Information or items required from other agencies

c Develop a quality assurance program that ensures correct error-free plans are produced by the project designers. _____ X_____

d The consultant will coordinate the technical aspects of the planning efforts such as: _____ X_____

i Ensuring that the separate projects all utilize the same reference and data base for horizontal and vertical control.

ii Bearings, coordinates, grades and elevations are identical for common control lines on separate projects.

iii Earthwork balance is accomplished where appropriate

B. Information Services

a Provide a management information system to monitor and report progress. _____ X_____

This System will include a computer terminal and/or software for the CDOT/PM which the consultant will furnish and maintain. This system will:

i Provide access to current project data and status (e.g., progress versus schedules and cost estimates versus budgeted funds)

ii Include the project schedules for submittals and key events

iii Identify progress with respect to the schedules

iv Identify critical path activities

	CDOT/ Other	Consultant
v Provide upon demand the scheduled submittals/key events for designated time periods		
b Produce and periodically update a strip map which outlines the entire corridor.	_____	X_____
The Information Shown on this Map will Include the Following:		
i Preliminary engineering project limits		
ii Construction project limits		
iii Construction project estimated costs		
iv Construction project Advertise-for-Bid (AD) dates		
v Other information that is considered appropriate		
C. Budget Planning Support		
a Maintain a current file of project cost estimates.	_____	X_____
The date and type of each estimate will be identified.		
b Maintain a current file of existing and proposed funding for projects.	_____	X_____
Types of funding sources will be identified.		
c Develop a proposed ad schedule based on the estimated costs and the existing and anticipated future funding.	_____	X_____
The proposed ad schedule will be compared to the design schedule. Adjustments to the design and ad schedules may be made with CDOT concurrence.		
d A continuing evaluation of cash flow requirements for administrative, preliminary engineering, right-of-way, utility, and construction costs will be accomplished. The funding requirements will be compared with the budget, also on a continuing basis. CDOT will be notified immediately of changes in funding requirements. (this will be completed when needed)	_____	X_____

SECTION 8
SERVICES AFTER DESIGN
3/21/08

The Consultant shall appoint a responsible member of the firm to be the contact person for all construction services. That person should be available until the end of construction to coordinate the following serves:

		CDOT/ Others	Consultants
1	**REVIEW OF SHOP DRAWINGS**	_____	X_____

Review contractor shop and auxiliary drawings as directed by the CDOT/PM.

A. Maintain a log of all submittals which includes the following information:

   a Submittal description

   b Date received

   c Date transmitted back to the sender

B. The review of submittals shall be done by a licensed professional engineer who is acceptable to the CDOT/PM.

C. Review the construction contractor's shop drawings for conformance and compliance with the contract documents, the provisions of the current "Standard Specifications for Road and Bridge Construction and with the time frames shown in the CDOT specifications in conjunction with the contract work.

2	**CONSTRUCTION SERVICES**		

When requested by the appropriate Program Manager, the Consultant shall provide the services described below

A.	Coordinate Schedule	_____	N/A____

Coordinate the schedule at the start of construction and continuously throughout construction phase

B. Provide field observation prior to, and on the day of, the following:

a	Pile driving and/or caisson drilling	_____	N/A____
b	All major concrete pours	_____	N/A____
c	Placement of girders	_____	N/A____
d	Splicing of girders	_____	N/A____
e	Post-tensioning duct and anchorage placement	_____	N/A____
f	Post-tensioning operations	_____	N/A____
C.	Technical Assistance	_____	N/A____

Provide technical assistance to CDOT project personnel on an as-needed basis. This service shall include, but not be limited to, the following:

a. Respond to questions in the field that arise relative to the plans, details or special provisions. _____ N/A____

b. Provide engineering and drafting services for design revisions required due to changes in construction or field conditions. _____ N/A____

D. The following reports/submittals shall be maintained and submitted:

a Diary _____ N/A____

A complete diary will be accomplished daily for each field observation activity.

b Documentation/justification _____ N/A____

Changes/revisions/documentation justifying changes and/or revisions to plans and specifications

c Progress reports _____ N/A____

Monthly progress reports will be submitted for the Consultant's activities.

d Calculations, drawings, and specifications as needed. _____ N/A____

e Daily time sheets _____ N/A____

This will be filled out daily on a form approved by the Project Engineer. This sheet will remain with the Project Engineer.

3 **POST DESIGN PLAN MODIFICATIONS** _____ X_____

When requested by the Program Manager through the CDOT/PM, the Consultant shall provide design services for plan modifications required by unforeseen field conditions.

4 **POST CONSTRUCTION SERVICES**

A. Final Earthwork or Interim Determination _____ N/A____

Compute the final or interim as-built earthwork quantities. This will include the required surveying, engineering technician, and computer support.

B. "As-Built" Plans _____ N/A____

Modify the original plans so that the plans will agree with actual construction results.

C. Revisions to the Final Right-of-Way Plans _____ N/A____

Review the final Right-of-Way line to identify any excess property due to construction changes. Prepare Final Plan Revisions, including legal Descriptions of excess property

D. Monument the Right-of-Way according to State Statutes and the CDOT Survey Manual _____ N/A____

a Reset all monuments referenced prior to construction that have been damaged or destroyed.

b Reset any control monuments disturbed or destroyed by construction that are necessary to set Right-of-Way monuments.

c Set all new Right-of-Way monuments as shown on final plans (or reference monuments, if necessary).

E. Set property corners on all remainder parcels _____ N/A____

Required monumentation will be as directed by the CDOT PM.

F. Deposit ROW Plans _____ N/A____

A Record Plan Set updated for revisions and showing all monuments set subsequent to construction, must be signed and sealed by the Professional Land Surveyor responsible for the work. The Record Set must be deposited in the appropriate county office in accordance with CRS 38-50-101 and CRS 38-51-107. A copy of the deposited plan set must be delivered to the CDOT/PM.

5 **CONSTRUCTION ENGINEERING**

A. Construction Management

Inspection & Materials Testing
Scope of Work

a Scope Date _N/A_____.

b Region _____N/A_____.

B. The Contract Administrator for this Task Order will be:

a Resident Engineer ___N/A_____.

b Residency __N/A_____.

c Region _____N/A____.

Active Day to Day administration and monitoring of this contract will be delegated to the following CDOT employee:

a Name: _____ N/A _____.

b Title: _____ N/A _____.

c Address: _____ N/A _____.

d City, State, Zip: ___ N/A _____.

e Voice phone: _____ N/A _____.

f Fax Phone: ____ N/A _____.

TABLE 1…SUBMITTALS

Hard Copy	Electronic Copy		Project Initiation and Continuing Requirements	CDOT/OTHER	CONSULTANT
	PDF	Orig.			
X		X	Periodic Reports		
X	X		Billings		
X		X	Meeting Minutes		
X	X		Project Schedule		
X		X	Completed Specific Design Criteria		
X	X		Survey Plan		
X	X		Approved MHT's		
X	X		Traffic Control Supervisor Certification		
X	X		Permissions to Enter		
		X	Initial Submittal of InRoads TMOSS (?) Compatible Data		
X	X	X	Initial Submittal of an Original Plan Sheet		
			Project Development		
X		X	Public Communication Contact List		
			Route Location Survey		
X	X		Traffic Control Supervisor Certification		
X	X		Approved MHT's		
X	X		Survey Equipment Calibration		
		X	Survey data in raw, unedited formats		
X		X	Pothole data including invert elevations		
X	X		Culverts report		
X	X		Access report		
X	X		Topographic survey notes		
X	X	X	Contour plan checked for errors		
X	X	X	Survey control diagram		
X			Field books		
		X	Electronic Survey Files		
		X	Survey TMOSS Data		
X		X	Monument Records		
X	X	X	Control & Monumentation Plan Sheets		
X	X		Aerial Photography Index Map Sheets		
X	X		Aerial Photography Contact Sheets		
			Permits		
X	X		401 Permit		
X	X		Dewatering / 402 Permit		
X	X		404 Permit		
X	X		SB 40 Permit		
X	X		Wildlife Certification		
X	X		CDPS Storm Water Permit		
X	X		CDPHE Discharge Permit		
			Preliminary Design		
		X	Electronic Survey Data		
X	X		Traffic Data & Recommendations		
X	X		Geology & Soils Investigation Report		
X	X		Pavement Design Report		
X	X		Existing Bridge Condition Report		
X	X		Foundation Investigation Report		

Table 1…SUBMITTALS (CONT.)

Hard Copy	Electronic Copy		Preliminary Design (Cont.)	CDOT/OTHER	CONSULTANT
	PDF	Orig.			
X	X		Engineering Geology Plan Sheet(s)		
X	X		Preliminary Hydraulics & Hydrology Report		
X	X	X	Preliminary Storm Water Management Plan		
X	X		Utility Relocation Recommendations		
X	X	X	Ditch Structure Plans		
X	X		Structural Selection Report		
X	X		Foundation Investigation Request		
X	X		Intersection Traffic Report		
X	X		Traffic Report		
X	X		Preliminary Cost Estimate		
X	X	X	FIR Plan Set		
X	X		List of deviations from Standard Design Criteria		
X	X	X	Corrected FIR Plan Set		
X	X	X	Stabilization Plans		
			Final Design		
X	X	X	ROW Authorization Plans		
X	X		Final Materials Recommendations		
X	X		Final Pavement Selection Report		
X	X		Final Hydraulics & Hydrology Report		
X	X	X	Final Utility Plan Set		
X	X	X	Final Railroad Plan Set		
X	X		PUC Exhibit		
X			Bound Final Geotechnical Report		
X	X		Correspondence with Agencies, Entities, and Public		
			Right-of-way		
X	X		Memorandum of Ownership		
X	X	X	Preliminary Ownership Map (include in FIR Plan set)		
X	X		Area Calculations		
X	X	X	Authorization Plans		
X	X		Legal Descriptions		
X	X	X	Final Right-of-way Ownership Map		
			Traffic Engineering		
X	X		Safety Assessment		
X	X	X	Signing/Pavement Marking Plans		
X	X		Signal Warrant Study		
X	X	X	Signalized Intersection Plans & Specifications		
X	X	X	Traffic Control Plan		
			Roadside Planning		
X	X	X	Landscape Plan & Specifications		
X	X		Certification of Plant Availability		
X	X	X	Irrigation Plans & Specifications		
X	X	X	Bike path Plans & Specifications		

X	X	X	Sound Barrier Plans & Specifications		
X	X	X	Truck Escape Ramp Plans & Specifications		
X	X	X	Rest Area Plans & Specifications		

Table 1…SUBMITTALS (CONT.)

Hard Copy	Electronic Copy		Roadside Planning (Cont.)	CDOT/OTHER	CONSULTANT
	PDF	Orig.			
X	X	X	Lighting Plans & Specifications		
X	X	X	Structure Final Review Plans & Specifications		
X	X	X	Construction Phasing Plan		
X	X	X	Storm Water Management Plan		
X	X		FOR Plans & Specifications		
X	X		FOR Cost Estimate		
X	X	X	Final Review Revisions		
			Construction Plan Package		
X	X	X	Final Plans (11X17), Specifications & Estimate Package for Ad.		
X	X	X	Final Cross Sections		
X	X		Schedule of Quantities		
X	X		Design Decisions		
X	X		Variances		
X	X		Findings In the Public Interest		
		X	Original Surface Digital Terrain		
		X	Final Surface Digital Terrain Model		
		X	Design Digital Terrain Model		
X		X	Staking Data		
X	X	X	Earthwork Quantities		
X	X	X	Mass/Haul diagram		
X	X		Project Calculations (2 copies)		
X	X		Worksheets (2 copies)		
X	X		Design Notes		
X	X		Independent Design Review Reports		
X	X		Roadway Design Data Submittal		
X	X		Major Structure Design Final Submittal		
X	X		Bridge Construction Pack		
X			Record Plan Sets		

SECTION 9
CONTRACT CONCLUSION (CHECKLIST)
3/21/08

1 SUPPLEMENTAL WORK

It is anticipated that this contract may be supplemented for:

A. Preliminary Design
B. Final Design
C. Construction Services
D. Construction Engineering
E. Final Earthwork Determination
F. Completion of the "as-built" plans and/or final ROW plans

Note: cross out items that are not appropriate.

2 CONTRACT COMPLETION

This Contract will be satisfied upon acceptance of the following items if applicable:

A. Project Schedule
B. Project Progress Meeting Minutes
C. Traffic Control Plan(s)
D. All documents found In Research
E. All Permission to Enter forms
F. Monumented & Surveyed Ground Control Diagram(s)
G. Legally Deposited Control Survey Diagram(s)_
H. Digital TMOSS Data
I. Photography Products
J. Ownership Map
K. Original Field Notes
L. Survey Report (including monument recovery forms)
M. Monumented and Sealed ROW Plans
N. Legally Deposited Survey Plans
O. Legal Descriptions (Signed and Sealed)
P. NOAA-NGS Blue Book
Q. Completion of review of contract submittals
R. Design Plans, Specifications, and Final Estimate
S. All Environmental Permits
T. All environmental , Utility and ROW Clearances
U. Hydraulic Report

V. Structural Report
W. Geotechnical Report
X. Materials Report
Y. Noise Study

APPENDICES

3/21/08

A. REFERENCES

B. SPECIFIC DESIGN CRITERIA

C. DEFINITIONS

D. SURVEY REQUIREMENTS

APPENDIX A
REFERENCES

1 **AMERICAN ASSOCIATON OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) PUBLICATIONS** (using latest approved versions):

A. A Policy on Design Standards-Interstate System

B. A Policy on Geometric Design of Highways and Streets

C. Guide for Design of Pavement Structures

D. Standard Specifications for Highway Bridges

E. Guide for the Design of High Occupancy Vehicle and Public Transfer Facilities

F. Guide for the Development of Bicycle Facilities

G. Standard Specifications for Transportation Materials and Methods of Sampling and Testing – Part 1, Specifications and Part II, Tests

H. Highway Design and Operational Practices Related to Highway Safety

I. Roadside Design Guide

2 **COLORADO DEPARTMENT OF TRANSPORATION PUBLICATIONS** (using latest approved versions):

A. CDOT Design Guide (all volumes)

B. CDOT Bridge Design Guide

C. CDOT Bridge Detailing Manual

D. Bridge Rating Manual

E. Project Development Manual

F. Erosion Control and Storm Water Quality Guide

G. Field Log of Structures

H. Cost Data Book

I. Drainage Design Manual

J. CDOT Quality Manual

K. CDOT Survey Manual

L. CDOT Field Materials Manual

M. CDOT Design Guide, Computer Aided Drafting (CAD)

N. Erosion Control and Storm water Quality Guide

O. Standard Plans, M & S Standards

P. Standard Specifications for Road and Bridge Construction and CDOT Supplemental Specifications

Q. Item Description and Abbreviations (with code number) compiled by Engineering Estimates and Marked Analysis Unit, CDOT

R. Right-of-Way Manual, Chapter 2, Plans and Descriptions Procedures and General Information

S. The State Highway Access Code

APPENDIX A

REFERENCES (CONTINUED)

T. Utility Manual

U. TMOSS Generic Format

V. Field TMOSS Topography Coding

W. Topography Modeling Survey System User Manual

X. Interactive Graphics System Symbol Table

3 **CDOT PROCEDURAL DIRECTIVES** (using latest approved versions):

A.	No. 400.2	Monitoring Consultant Contracts
B.	No. 501.2	Cooperative Storm Drainage System
C.	No. 514.1	Field Inspection Review (FIR)
D.	No. 516.1	Final Office Review (FOR)
E.	No. 1217a	Survey Request
F.	No. 1304.1	Right-of-Way Plan Revisions
G.	No. 1305.1	Land Surveys
H.	No. 1601	Interchange Approval Process
I.	No. 1700.1	Certification Acceptance (CA) Procedures for Location and Design Approval
J.	No. 1700.3	Plans, Specifications and Estimates (PS&E) and Authorization to Advertise for Bids under Certifications Acceptance (CA)
K.	No. 1700.5	Local Entity/State Contracts and Local Entity/Consultant Contracts and Local Entity/R.R. Contracts under C.A
L.	No. 1700.6	Railroad/Highway Contracts (Under Certification Acceptance)
M.	No. 1905.1	Preparation of Plans and Specifications for Structures prepared by Staff Bridge Branch

4 **FEDERAL PUBLICATIONS** (using latest approved versions):

A. Manual on Uniform Traffic Control Devices

B. Highway Capacity Manual

C. Urban Transportation Operations Training – Design of Urban Streets, Student Workbook

D. Reference Guide Outline – Specifications for Aerial Surveys and Mapping by Photogrammetric Methods for Highways

E. FHWA Federal-Aid Policy Guide

F. Technical Advisory T6640.8A

G. U.S. Department of Transportation Order 5610.1E

H. Geometric Geodetic Accuracy Standards and Specifications for Using GPS Relative Positioning Techniques

I. ADAAG Americans With Disabilities Act Accessibility Guidelines

5 **AREA**:

A. Manual for Railway Engineering

APPENDIX B

SPECIFIC DESIGN CRITERIA

Note: The following criteria will be developed by the consultant and coordinated with the CDOT/PM prior to starting the design.

1. ROADWAY

A. BASIC DESIGN

The basis for design will be the data in CDOT Form 463, Design Data. A copy of the latest applicable design Data form will be furnished to the consultant

B. GEOMETRIC AND STRUCTURE STANDARDS

a Design Speed

b Horizontal Alignment and Curvature

i Applicable Superelevation Standards

ii Minimum radius of Curvature

iii Use of Spirals

c Vertical Alignment:

i Maximum gradient – CDOT Design Guide

ii Length – CDOT Design Guide

d Sight Distance:

i Stopping -

ii Passing -

iii Decision -

e Superelevation, Applicable Standard

f Frontage Roads, Separation Width

g CDOT Access Code

h Airway – Highway Clearances Design Guide

i Bridges and Grade Separation Structures, Clearances to Structures and Obstructions, CDOT Design Guide

j Curb and Gutters, Type

APPENDIX D
SURVEY REQUIREMENTS (CONT.)

APPENDIX B

SPECIFIC DESIGN CRITERIA (CONTINUED)

C. GEOMETRIC CROSS SECTION

a Travel Lane:

i Width –

ii Cross Slope –

b Shoulder:

i Width –

ii Slope –

iii Paved/Nonpaved

c Side Ditches:

CDOT Design Guide

d Side Slopes

i Cut-Less than 3:1

ii CDOT Design Guide

iii Clear zone

e Median:

i Width –

ii Treatment –

D. INTERSECTIONS AT GRADE:

a Type - _____

b Special Considerations –

E. TRAFFIC INTERCHANGES:

a Type –

b Ramp Type –

c Special Considerations –

F. DESIGN OF PAVEMENT STRUCTURE:

a Pavement Type - _____

b Percent Trucks

APPENDIX B

SPECIFIC DESIGN CRITERIA (CONTINUED)

c Economic Analysis Period –

d Design Life –

G. MISCELLANEOUS DESIGN CONSIDERATIONS

a Fence Type -

b FEMA Category –

c Design Flood Frequency

H. ROADSIDE DEVELOPMENT

a Landscaping

b Specifications for Revegetating Disturbed Areas to be provided by CDOT.

c Noise Control

d Type

e Guardrail and End Treatments

I. LIGHTING

a Type

APPENDIX D
SURVEY REQUIREMENTS (CONT.)

APPENDIX C

DEFINITIONS

1	AASHTO-	American Association of State Highway & Transportation Officials
2	ADT-	Average two-way 24-hour Traffic in Number of Vehicles
3	AREA-	American Railway Engineering Association
4	ATSSA-	American Traffic Safety Services Association
5	AT&SF-	Atchison, Topeka & Santa Fe Railway Company
6	ADAAG-	Americans with Disabilities Accessibility Act Guidelines
7	BAMS-	Bid Analysis and Management Systems
8	BLM-	Bureau of Land Management
9	BNRR-	Burlington Northern Railroad
10	CA-	Contract Administrator. The CDOT Manager responsible for the satisfactory completion of the contract by the consultant.
11	CAP-	CDOT's Action Plan
12	CBC-	Concrete Box Culvert
13	CDOT-	Colorado Department of Transportation
14	CDOT/PM-	Colorado Department of Transportation Project Manager – The CDOT Engineer responsible for the day to day direction and CDOT Consultant coordination of the design effort.
15	CDOT/STR-	Colorado Department of Transportation Structure Reviewer – The CDOT Engineer responsible for reviewing and coordinating major structural design
16	CDPHE-	Colorado Department of Public Health and Environment
17	CEQ-	Council on Environmental Quality
18	COG-	Council of Governments
19	COGO-	Coordinate Geometry Output
20	CONSULTANT-	Consultant for this project
21	CONTRACT ADMINISTRATOR-	Typically a Region Engineer or Branch Head. The CDOT employee directly responsible for the satisfactory completion of the contract by the Consultant. The contract administration is usually delegated to a CDOT Project Manager.

APPENDIX C

DEFINITIONS (CONTINUED)

22	C/PM-	Consultant Project Manager – The Consultant Engineer responsible for combining the various inputs in the process of completing the project plans and managing the Consultant design effort.
23	DEIS-	Draft Environmental Impact Statement
24	DHV-	Future Design Hourly Volume (two-way unless specified otherwise)
25	DRCOG-	Denver Regional Council of Governments
26	D&RGW-	Denver & Rio Grande Western Railroad
27	EA-	Environmental Assessment
28	EIS-	Environmental Impact Statement
29	ESAL-	Equivalent Single Axle Load
30	ESE-	Economic, Social and Environmental
31	FEIS-	Final Environmental Impact Statement
32	FEMA-	Federal Emergency Management Agency
33	FHPG-	Federal Aid Highway Policy Guide
34	FHWA-	Federal Highway Administration
35	FIPI-	Finding In Public Interest
36	FIR-	Field Inspection Review
37	FONSI-	Finding of No Significant Impact
38	FOR-	Final Office Review
39	GPS-	Global Positioning System
40	MAJOR STRUCTURES-	Bridges and culverts with a total clear span length greater than twenty feet. This length is measured along the centerline of roadway for bridges and culverts, from abutment face to abutment face, Retaining structures are measured along the horizontal distance along the top of the wall. Structures with exposed heights at any section over five feet and total lengths greater than a hundred feet as well as overhead structures including (bridge signs, cantilevers and butterflies extending over traffic) are also considered major structures.

APPENDIX C

DEFINITIONS (CONTINUED)

41	MPO-	Metropolitan Planning Organization (i.e. Denver Regional Council of Governments, Pikes Peak Area Council of Governments, Grand Junction MPO, Pueblo MPO, and North Front Range Council of Governments).
42	MS4-	Municipal Separate Storm Sewer System
43	NEPA-	National Environment Policy Act
44	NGS-	National Geodetic Survey
45	NICET-	National Institute for Certification in Technology
46	NOAA-	National Oceanic and Atmospheric Administration
47	PAPER SIZES-	See Computer-Aided Drafting Manual (CDOT); Table 6-13 and Table 8-1
48	PE-	Professional Engineer registered in Colorado
49	PM-	Program Manager
50	PLS-	Professional Land Surveyor registered in Colorado
51	PRT-	Project Review Team
52	PS&E-	Plans, Specifications and Estimate
53	PROJECT-	The work defined by this scope
54	ROR-	Region Office Review
55	ROW-	Right-of-Way: A general term denoting land, property, or interest therein, usually in a strip acquired for or devoted to a highway
56	ROWPR-	Right-of-Way Plan Review
57	RTD-	Regional Transportation Director
58	T/E-	Threatened and/or Endangered Species
59	SH-	State Highway Numbers
60	TMOSS-	Terrain Modeling Survey System
61	TOPOGRAPHY-	In the context of CDOT plans, topography normally refers to existing cultural or man-made details.
62	UD & FCD-	Urban Drainage and Flood Control District
63	USCOE-	United States Army Corp of Engineers

Note: For other definitions and terms, refer to Section 101 of the CDOT Division of Highways Standard Specifications for Road and Bridge Construction and the CDOT Design Guide.

PRECONSTRUCTION SURVEY TASK DESCRIPTIONS

APPENDIX D
SURVEY REQUIREMENTS (CONT.)

Table of Contents

APPENDIX D
SURVEY REQUIREMENTS (CONT.)
SECTION 1

PRECONSTRUCTION WORK TASK DESCRIPTIONS

The following includes work descriptions for all tasks normally accomplished during this phase of the work. Work items listed may need to be advanced in time period in order to meet compressed schedules.

The tasks that could be the responsibility of the consultant are identified in the Scope of Work. The Consultant should review this entire section to identify applicable material. Contact the CDOT/PM if clarification is required.

The following activities of communication and consensus building, project team reviews, conceptual design, gather data, documentation, and formal public notice should be planned by the Consultant and coordinated with the CDOT/PM to satisfy the requirements of the "Procedures for Public Involvement and Participation in the Project Development an Environmental Analysis Process". The time of their accomplishment will overlap and parallel paths of activity should be planned to finish the development phase in accordance with the shortest possible schedule. The type and number of meetings, documents, etc. will depend on the category and characteristics of the project work. A project plan will be developed by the Consultant that satisfies the requirements of the project. This plan must be approved by the project manager before starting the work.

1.01 Project Initiation and Continuing Requirements

A. Initial Project Meeting. An initial meeting will be held and an on-site inspection (when appropriate) will be made to ensure that the Consultant is familiar with the existing conditions as well as the project requirements. This meeting will be coordinated by the Consultant and conducted by the CDOT/PM. Notices for the meeting are to be sent by the Consultant. A scope of work, man-hour estimate and the project cost work sheet designated by the NPS contract will be developed from this meeting.

1. If this contract is for the production of right of way plans, the consultant or sub-consultant actually designing the right of way plans shall attend a "pre-survey" conference with the CDOT/PM.

2. A "Pre-Survey" conference between the consultant and the CDOT/PM will be held prior to any survey work performed. The CDOT Survey Manual provides several agendas for the Pre-Survey Conferences.

B. The consultant shall submit a proposed schedule to complete each survey task with each task order proposal. The schedule shall be negotiated with the CDOT project manager before the task order proposal is accepted. A Gantt chart showing all work tasks, the duration of each task, the resources assigned to each task, and the relationship of each dependant task shall be prepared and submitted to the project manager. It is the consultant's responsibility to communicate and document any delays or set backs in the schedule in the monthly status reports and submit a revised schedule Gantt chart.

C. The survey is initiated by the "Notice to Proceed" from the CDOT. The consultant is then responsible to begin the work. A CDOT Form 1217 Preliminary Survey Scope may be used as a guide for completing the survey scope. An example of the Form 1217 is included in the CDOT Survey Manual.

D. Obtain necessary right of entry (Permission to Enter - Form 730a) and permits. It is useful to start the project contact list called for in Part 2 Section 1.02 B. at this stage with the names of the adjoiners to the project. This list in spreadsheet format (i.e. Microsoft Excel) is used to make mailing labels and can be used to merge fields into subsequent documents and communications with landowners adjoining the corridor. The digital file of the list is a required submittal.

1. Some activities may require work on land not controlled by the CDOT. In such cases the Consultant shall obtain the necessary written permission to enter the premises. Included in this written permission will be the names and telephone numbers of persons to contact should notification prior to entry be necessary. These written permissions will apply to CDOT

personnel as well as Consultant personnel. CDOT Form 730a must be used for this purpose. Signed copies of the written permission will be submitted to the CDOT/PM prior to entering private property for survey work. Include County Tax Plat parcel number on Form 730a when submitting to CDOT so completed Permission to Enter can be located on County Tax Plat.

2. Some activities such as materials testing on existing pavement and structures may require a special use permit or temporary easement from the landowner. Permits and temporary easements will be obtained by the consultant and copies submitted to the CDOT/PM.

E. Traffic Control. Consultant field activities that interfere with traffic operation within existing roadways will require control of existing traffic. The Consultant will plan and provide any required traffic control for the survey, testing, or design process. Traffic control operations will be in accordance with the MUTCD. The Consultant will note that the proposed method for handling traffic must be acknowledged in writing by the CDOT/PM. Also, certification of the Traffic Control Supervisor as a Worksite Traffic Supervisor by the American Traffic Safety Services Association (ATSSA) will be required. The consultant should schedule a two-week review period for the approval of the traffic control plan. Region One has in place an extensive lane closure strategy that provides authoritative guidance for scheduling lane closures in Region one. Copies of the technical report are available from the R-1 Traffic unit.

F. Initial Submittals. Submit the following samples to the CDOT/PM for approval:
- An original plan sheet that complies with Part 2, Section 2 of this scope.
- Photogrammetric and/or survey data and a drawing or photograph in accordance with the requirements specified in Part 2, Section 2.

NO ORIGINAL PLAN SHEETS OR PHOTOGRAMMETRIC SURVEY WORK WILL BE ACCOMPLISHED UNTIL SATISFACTORY SAMPLES HAVE BEEN RECEIVED AND APPROVED BY THE CDOT/PM.

G. Progress Meetings

1. The CDOT and Consultant Project Managers will meet periodically as required (typically at one month intervals). These Progress Meetings will be used to coordinate the work effort and resolve problems. The meetings will review the following:

   a. Activities completed since the last meeting.
   b. Problems encountered.
   c. Delayed and behind schedule activities.
   d. Activities required by the next progress meeting.
   e. Solutions for unresolved and anticipated problems.
   f. Information or items required from other agencies.

2. Other required meetings are described in the following sections.

H. Safety

1. Consultants working within the CDOT Right of Way are subject to all safety requirements of the department and OSHA. See Chapter 7 of the CDOT Survey Manual for a list of the CDOT policy and procedural directives and other references to CDOT safety manuals and guides. The consultants engaged by this non-project specific contract shall assume the responsibilities listed in the CDOT Survey Manual for the region survey coordinator for all consultant employees and crew members.

I. Project Management – The consultant will coordinate all the work tasks being accomplished by all parties to ensure project completion on schedule.

1.02 Project Development

A. Communication and Consensus Building. Establish and maintain a computerized list or database of all appropriate receptors for the communication process. The data shall be in Microsoft Excel format.

The contacts will be compiled from the general list below as supplemented by the Project Review Team and the attendees at public meetings.

The list will be used for notices regarding public meetings, mailing newsletters, or other communications as appropriate.

The information on the list shall include as a minimum:

Name
Firm (if any)
Mailing address
Phone number

1. Contact List:

Property owners adjoining the project
Public Agencies
Neighborhood Groups
Property Owners/Tenants
Business Interests
Special Interests
Railroads

The contact list shall be delivered to CDOT in Microsoft Excel format.

2. General Meetings. The types and number of meetings shall be flexible and determined by an interactive process as approved by the CDOT/PM.

   a. Small Group Meetings (one-on-one). Meet with property and business owners or others directly affected by the project work to identify likely impacts and discuss possible mitigation or resolutions. Minutes of these meetings will be provided to all participants by the consultant.
   b. Project Review Meetings. These meetings are intended to disseminate project progress information to the public and representatives of local entities. Notices will be mailed at least 14 days in advance of these meetings to those on the contact list. The Consultant will provide the presentation aids, conduct the meeting, and provide complete minutes of the meetings to CDOT.

3. Communication Aids

   a. Graphics Support. Provide the graphics for public presentations and environmental documents. This may include 35mm slides, overhead projector slides, maps and plan views of conceptual design, and other displays for visual presentations at meetings.

B. Route Location Surveys. Surveys will be conducted in accordance with the CDOT Survey Manual and the latest addendum thereof.

1. See the CDOT Survey Manual General Procedures (CDOT Survey Manual Chapter 2) for a detailed description of the following work tasks and elements.

   a. Equipment Checking and Calibration (CDOT Survey Manual Chapter 2.1)
   b. Calibrations (CDOT Survey Manual Chapter 2.2)
   c. Error Sources in Surveying (CDOT Survey Manual Chapter 2.3)

d. Field notes (CDOT Survey Manual Chapter 2.4)
e. Preliminary Survey Scope Form 1217a (CDOT Survey Manual Chapter 2.5)
f. Presurvey Conference (CDOT Survey Manual Chapter 2.6)
g. Special Use Permit Form 1283a (CDOT Survey Manual Chapter 2.7)
h. Manual of Uniform Traffic Control Devices (MUTCD) 6H-16 & 6H-10 (CDOT Survey Manual Chapter 2.8). Region One has a lane closure strategy technical report that is available from the Traffic engineer. The lane closure strategy is a guiding document on when lanes can be closed for work.
i. Permission to Enter Property Form 730a (CDOT Survey Manual Chapter 2.9)
j. Underground Utility Locates Prior to Installing Monumentation (CDOT Survey Manual Chapter 2.10)

2. Global Positioning System Surveys (CDOT Survey Manual Chapter 3 and Appendices)

a. GPS Survey Specifications (CDOT Survey Manual Chapter 3.1 and Appendices).This includes GPS reports and a submittal for the CDOT GPS control monument database and specifications for blue book data for submittal to the NSRS. The appropriate GPS report is required for each survey performed.
b. Error Sources in GPS (CDOT Survey Manual Chapter 3.2). Procedures are required to reduce errors.
c. GPS Equipment Checking and Calibration (CDOT Survey Manual Chapter 3.3). A CDOT approved method is required for each project.
d. GPS Survey Methods (CDOT Survey Manual Chapter 3.4). The project survey scope will specify the survey required.
e. Static and Fast Static Network Design (CDOT Survey Manual Chapter 3.5). Consultant is responsible for network design.
f. GPS Planning (CDOT Survey Manual Chapter 3.6) procedures are to be adhered to.
g. GPS Vertical Procedures (CDOT Survey Manual Chapter 3.7). GPS derived orthometric heights are used to check and trouble shoot differential leveling on CDOT control monuments. GPS vertical procedures may not be used to establish elevations.
h. GPS Horizontal Procedures (CDOT Survey Manual Chapter 3.8) shall be followed for the survey type requested.
i. Project Control Diagram and Land Survey Control Diagram (CDOT Survey Manual Chapter 3.9) shall be prepared for the survey performed. (See the General Cell Library in the CDOT configuration in MicroStation for the appropriate sheets to use.)
j. Continually Operating Reference Stations (CORS) (CDOT Survey Manual Chapter 3.10) the consultant must supply the eight items listed to the survey coordinator for the prior approval of the use of CORS stations. The final constrained adjustment must also be provided.
k. On-Line Positioning User Service (OPUS) (CDOT Survey Manual Chapter 3.11) is used to check prior processing.

C. Aerial Surveys (refer to CDOT Survey Manual Chapter 4 for specifications and deliverables)

D. Right of Way (ROW)

a. Early ROW

(1) Perform a field inspection of each short-listed alignment. Ascertain number of parcels, types of improvements, and possible problem areas (i.e., mobile homes, functional replacements, historical sites, etc.). Identify parcels which could require relocation activities.
(2) Using city surveys, courthouse records, and real estate listings, compile information on neighborhood characteristics, price ranges for land and improvements, housing available, minority percentages, etc.
(3) Compile a ROW cost estimate for each alignment.
(4) Prepare a conceptual relocation study.
(5) Identify potential problem areas.
(6) Prepare a property ownership map based on tax assessors' records that identify owners for each alignment.
(7) Prepare a land use map that identifies land usage along each alignment. The parcel use categories shall utilize appropriate categories including:
(a) Land in public ownership: specific use and responsible agency/jurisdiction
(b) Commercial: retail, wholesale, industrial, other commercial
(c) Residential: single or multi-family
(d) Vacant

(e) Mixed Uses
(f) Other (specific)

(8) Ownership Maps
(9) Monumentation - Set right of way monuments at all angle points, points of curvature, end of curvature, and no more than 1400' apart on tangent sections of the right of way (per CDOT MOU). If no monuments are found then monuments must be set on all preliminary ROW surveys. Preliminary ROW mapping projects also require monuments if field investigations uncover a lack of monuments at each angle point or change in curvature on a curve, or on tangent sections of the right of way longer than 1400'. This preliminary ROW survey to establish, calculate, monument and plat the existing ROW line is called ROW mapping or a monumented land survey of the ROW in the project scope. A plat suitable for filing in the county records is required.

b. ROW Review

(1) Review the impact of each proposed alignment on existing and known future land use.
(2) Prepare a ROW report that summarizes the findings and includes:
(a) A cost estimate for each alignment
(b) A relocation evaluation for each alignment
(c) Identified problem areas
(d) Ownership map
(e) Land Use Map

1.03 Preliminary Design

A. Preliminary Surveys. This work shall be done in accordance with the CDOT Survey Manual, State board of registration rules and policies and applicable state statutes.

1. See General procedures in the CDOT Survey Manual Chapter 5.
2. In addition to the reconnaissance survey described in the CDOT Survey Manual reconnaissance is done on the project site to determine an effective survey plan. GPS satellite visibility, project accessibility, and the general lay of the land are determined.
3. Research is conducted for all applicable materials, recorded and field data, as described in the CDOT Survey Manual.
4. Railroad research and permission to enter the railroad is conducted as described in the CDOT Survey Manual. The survey consultant is responsible for training personnel in railroad safety procedures and guidelines.
5. Horizontal tolerance verification is documented as called for in the CDOT Survey Manual. The surveyor is responsible for choosing the proper method to meet the prescribed tolerances.
6. A control survey is established as described in the CDOT Survey Manual.
7. The horizontal control for the project is established by a method described in the CDOT Survey Manual. Primary and secondary control is described.
8. The vertical control survey is established according to the CDOT Survey Manual. Tolerances and documentation are described.
9. Differential leveling is required on the primary control points, CDOT class A. Differential leveling may be required on asphalt and concrete surfaces under this contract.
10. A Project Control Survey Diagram is prepared as described in the CDOT Survey Manual. The minimum standards and required notes and certifications are described.
11. A right of way survey is performed according to the CDOT Survey Manual. This is a monumented land survey according to Colorado Revised Statutes.
12. A Land Survey Control Diagram is prepared according to the CDOT Survey Manual. The general format and minimum standards, notes, and certifications are described.
13. Boundary analysis and platting is performed according to the CDOT Survey Manual. The determination of the boundary must be made by a PLS. The preponderance of evidence gathered including the recorded documents, field and topographic data, parole evidence, other found monuments, interviews of other surveyors among other things are all weighed and the decisions made presented in the project narrative.
14. TMOSS data is gathered and coded according to the CDOT Survey Manual. The coding method is based upon the file structure (columns and rows) described in the CDOT Survey Manual.
15. The topographic survey is performed according to the CDOT Survey Manual using the approved CDOT coding method. Coding is applied to every topographic field shot in order to produce an electronic scale model of the

terrain, improvements, and all existing features desired for the design of the project.

16. The drainage survey is included in the topographic survey as directed by the CDOT Survey Manual.
17. The utility survey is to include all underground utilities from surface located stakes and markings. The utility survey is included in the topographic survey.
18. Staking for appraisal includes establishing temporary stakes for proposed parcels for the purpose of the appraisal and negotiations with the present owner.

B. Utility Coordination

1. Location maps are to be procured from the utility and included in the survey report.
2. Contact Utilities and Utility Notification Center of Colorado to field mark utilities for InRoads TMOSS surveying.
3. Reviews and investigations. When "pot-holing" is designated by task order, the Consultant shall be responsible for the excavation. If designated in Scope of Work, the Consultant shall be responsible for surveying utility locations.
4. Underground utility locates. The consultant is responsible for contracting with an underground utility locator for surface marking underground utilities when called for in the task order.
5. Ditch Companies. Contact information is to be compiled and delivered to CDOT. Research into the title, rights and interest of the ditch companies is to be provided.

C. Right of Way. The following work shall be done by or under the immediate supervision of a PLS. The following work may be included as part of a surveying task order. The following work may also be included as part of right of way plans preparation task order.

1. Research. See CDOT Right of Way Manual.

   a. Identify affected ownership from preliminary design plans and assessors maps.
   b. Obtain assessors map, locating project limits.
   c. Locate documents that transfer title.
   d. Prepare 60 year long chain of title as directed by the CDOT/PM.
   e. Look for encumbrances, releases, etc.
   f. Make physical inspection of property. Note any physical evidence of easements, wells, ditches, ingress and egress.
   g. Check with County Road Department or County Engineer for location of existing roads.
   h. Check for latest sub-division plats and vacation of streets.
   i. Memoranda of ownership shall be as described in the Right of Manual Chapter 2.

2. Ownership Map. See CDOT Right of Way Manual. For additional detail on required drafting software, COGO, and project coordinate system see SECTION 2 - SUBMITTALS. Ownership map shall be submitted along with a "Project Narrative" see SUBMITTALS - C.3.b

   a. Review preliminary design and field survey notebooks.
   b. Review Basis of Bearing and Project Coordinate system from the Control Survey prior to calculations.
   c. Compute alignment of ROW and store coordinates of all found monuments within the first tier of properties within the project limits.
   d. Obtain and review ownership documents (Memorandums of Ownership and/or title commitment and supporting plats).
   e. Calculate coordinates of lost or obliterated corners using guidelines established by the Bureau of Land Management. (To be used by field surveyor in resetting the monuments.)
   f. Establish subdivisions of sections using Bureau of Land Management Guidelines. Show all Section Lines and ¼ section lines on the ownership map and ROW plans.
   g. Determine existing right of way limits from deeds of record, CDOT plans and found ROW markers. Previous right of way plans, if available, will be provided by CDOT as an aid.
   h. Determine ownership and their property/boundary line locations. Locate the intersection of these property boundary lines with the existing CDOT Right of Way. Determine location and ownership of existing easements of record. Show as measured dimensions compared to record dimensions where they differ.
   i. Secure additional property owner ties and additional topography where the highway improvement may affect

improvements adjacent to the right of way. This additional topography should include:

(1) Underground cables and conduits and any overhead utilities.
(2) Wells
(3) Irrigation ditches and systems
(4) Septic tanks, cesspools, and leaching fields.

j. Reconcile overlaps and gaps in ownerships as required by CDOT, documenting method used (may require additional field work). Include reasons and supporting evidence in the project narrative.
k. Plot ownership map on 11 inch x 17 inch Mylar sheets in accordance with specifications. The Sheet cell (see the Sheet cells provided in the General Cell Library in the CDOT MicroStation configuration) will be provided by CDOT for this purpose. Normal scale, 1" = 400' in rural areas, 1" = 200' in urban areas. If entire ownership will not fit on the sheet at this scale, an additional abbreviated Ownership map may be used at a scale of 1" = 1 mile, or other suitable scale, to show the configuration of large ownerships.
l. Label all monuments found with description of monument, point number, and project coordinates.
m. Show improvements and topography within the ownerships as well as existing access to the street system.
n. Number ownerships alternately as they occur along the Centerline from south to north or west to east in the same direction as the stationing. Show current names of owners and lessees.
o. Calculate the total area of all ownerships affected, including coordinates of all property corners. Deduct areas for existing road rights of ways. Establish bearings and distances on all ownership lines, including coordinate of all property corners.
p. Show areas of complex ownerships graphically by cross hatching different land uses.
q. In the lower right corner of the ownership map, show seal, number, name, and signature of Professional Land Surveyor supervising the work.
r. Transmit finished reproducible ownership map and Memorandums of Ownership to CDOT along with an electronic Drawing of the ownership map drawn to scale in MicroStation, all calculations, field notes, and supporting data. The ownership map will include a control and monument sheet. Note that only the project control data needs to be completed at this time.
s. The ownership map in electronic format shall be delivered and be suitable as the base map or master drawing from which all right of way plans and exhibits are developed in the next phase of the project.
t. Ownership map shall be as described in the Right of Manual Chapter 2 with the addition of the following 5 items:
   (1) The map shall include a description of monuments found.
   (2) All measured and record distances shall be shown.
   (3) A statement by the land surveyor in responsible charge shall be included.
   (4) The signature of the land surveyor in responsible charge
   (5) The seal of the land surveyor in responsible charge.
u. The ownership map shall be submitted electronically in MicroStation format with the understanding that this drawing will become the master drawing for any right of plans developed in the corridor.
v. This ownership drawing is to be completed to the standards of land survey plat.
w. Monumented Land Survey of right of way includes all requirements as called for in the Colorado Revised Statutes. This includes CRS 38-51, 38-52, 38-53, All Colorado State Board of Registration for Professional Engineers and Professional Land Surveyors by laws and rules including Rules and Standards for Property Boundary Surveys, Definition of Property Boundary Surveys, 6.4, and 6.5. All Policies of the state board of Registration are to be followed. Nothing in this scope relieves the consultant from complying with state statutes and Colorado State Board of Registration for Professional Engineers, Professional Land Surveyors and Architects rules and policies.

NOTE: The ROW Ownership Map shall be available for review at the time of the FIR.

1.04 Final Design

A. Right of Way Plans and Authorization Plan.
1. Verify toes of slope on base map from earthwork data.
2. Plot existing ownership lines from preliminary ownership map.
3. Plot new right of way requirements and access control from design plans following the FIR on base map. Normal scale, 1" = 50' in urban areas, 1" = 100' in rural areas.

4. Calculate areas of parcels, easements, and remainders in accordance with CDOT Right of Way Manual.
5. Prepare right of way plan sheets as outlined in CDOT Right of Way Manual. (See the sheet cell provided in the General Cell Library in the CDOT MicroStation configuration.) Note that distances on parcels shall be given in feet.
6. Prepare legal descriptions of parcels, easements and access control as directed by the CDOT Right of Way Manual. Note that distances are to be given in feet.
7. Prepare Tabulation of Properties sheet as directed by CDOT Right of Way Manual (See the sheet cell provided in the General Cell Library in the CDOT MicroStation configuration).
8. Plot new right of way, access control, new easements, and lane lines on the preliminary ownership map. Revise numbering of ownerships to correspond to right of Way acquisitions.
9. Prepare Right of Way Title Sheet as directed by CDOT Right of Way Manual. (See the sheet cell provided in the General Cell Library in the CDOT MicroStation configuration.)
10. Prepare Land Survey Control Diagram for inclusion in plans. See CDOT Survey Manual and the CDOT CADD Manual that can be found at, http://www.dot.state.co.us/ECSU/Manuals/CDOT_CADD_Manual/CDOT_CADD_Manual.htm for a sample.
11. Prepare Control and Monumentation Sheet (CDOT Survey Manual) including a complete list of right of way points to be set (i.e. ROW Angle Points), Permanent and Slope Easement points, Section Corner, Control Monuments per CDOT Right of Way Manual.
12. Transmit originals of the plan sheets, title sheet, tabulation of properties sheet, and revised ownership map to CDOT. Transmit current updated title work (Memorandum of Ownership and/or Title Commitments per CDOT PM/ROW manager); calculations and supporting data (i.e. parcel diaries). Original sheets shall comply with Part 2 Section 2. Project narrative is included in this submittal.
13. The Final Office Review (FOR) plans shall include the following sheets (as appropriate):

    Title Sheet
    Standard Plans List
    Typical Sections
    General Notes
    Summary of Approximate Quantities
    Appropriate Individual Quantity Tabulations
    Project Control Diagram or Land Survey Control Diagram*
    Survey Tabulation Sheet*
    Special Details
    Structure Details
    Bridge Hydraulic Information Sheet
    Roadway Plan and Profiles
    Bike path
    Interchange and Intersection Layouts
    Interchange Contour Grading and Drainage Plans
    Utility locations
    Irrigation Reconstruction
    Landscaping
    Storm Water Pollution Prevention Plan
    Lighting Plans
    Signalization Plans
    Signing and Striping
    Construction Phasing
    Detour
    Structure Cross Sections
    Roadway Cross Sections with Quantities

    *Survey Consultant is responsible for these sheets. A record set of plans will be signed and sealed by the consultant who prepared the plans.

    NOTE: This list may not include all the necessary sheets and may include some subjects not applicable to this particular project. The content of the plans will be as approved by CDOT.

The final ROW plans submitted must be authorized by FHWA. The Consultant is responsible to assure that the plans meet the standards imposed by FHWA. If FHWA requires changes in the submitted plans the changes required by FHWA will be at the consultant's expense.

Post Field Inspection Review Revisions. When specified in a task order, the Consultant shall complete the revisions required by the FIR before this phase of work is considered to be complete.

APPENDIX D
SURVEY REQUIREMENTS (CONT.)
SECTION 2
SUBMITTALS

2.01 Reports

From Section 1.01-A – A completed Preliminary Survey Scope Form 1217a, a man hour estimate, and a project cost work sheet for a specific rate of pay contract shall be submitted.

From Section 1.01-A-1 & 1.01-A-2 – A Pre-Survey conference agenda form is to be filled out and provided to the project manager after the pre-survey conference is held.

From Section 1.01-B – A project schedule is to be approved by the CDOT PM before any task order is approved. The consultant shall submit a written schedule with any task order proposal. The schedule shall include a Gantt chart as described.

From Section 1.01-C – Preliminary Survey Scope Form 1217a

From Section 1.01-D-1 & 1.01-D-2 – Original Permission to Enter forms, CDOT Form 730a, shall be submitted. A county assessors map or equivalent map of the project map is also to be submitted. This map is to be used as a base map for tracking the status of the completion of the permission to enter forms. Temporary easements or use permits Form 1283a may be required in lieu of or in addition to completed permission to enter forms.

From Section 1.01-E – When the consultant is required for safety reasons to close a lane of traffic, a traffic control plan shall be submitted for CDOT review before the traffic lane is closed.

From Section 1.01-F – Initial submittal of InRoads TMOSS, InRoads, and MicroStation data refers to a small sample of electronic data in InRoads TMOSS format which is submitted early in the project to assure CDOT that the final data will be in the correct format. CDOT's survey processing software is InRoads and Microstation. Submittals will be Inroads/Microstation files.

From Section 1.01-G – Minutes of progress meetings are required.

From Section 1.01-H – Confined space entry permits may apply.

From Section 1.02-A and 1.02-B – The contact list developed shall be in a Microsoft Excel format. This same format is used to create the tabulation of property owners for the right of way sheets. This contact list may include the permission to enter contacts. Additional contacts must be delivered in a separate spreadsheet file. Mailing lists may be required.

From Section 1.02-A-3 - Communication aids include digital aerial photos merged with survey data for computer projection, court exhibits, posters for public meetings and presentations, Microsoft Power Point presentations, etc.

From Section 1.02-B-1 & 1.02-B-2 – Survey Report and GPS Bluebook. One copy of the survey report shall be delivered by the consultant with any final submittal for each task order. The report shall be bound in a ring binder. The report in addition to the NGS blue book requirements shall include the following sections:

- a project description and scope of work
- Quality Control Report. Submit a report that itemizes the procedures taken to assure that the survey data is of specified quality. The report shall address the steps taken to assure quality in the following work elements: The horizontal control survey, the vertical control survey, the TMOSS survey, the property tie survey, and the aliquot corner survey. The report shall include actual closures, ratios, tolerances, and differences detected while performing the work and evaluating quality. The report is to be signed by the PLS in responsible charge of the survey work. A sample outline is included in attachment to Scope of Work - Part 2, Attachment D. The office procedures used to produce record documents shall also be discussed in the quality control report.

From the CDOT Survey Manual products to be delivered to CDOT or deliverables in the project development stage may include:

- A copy of the Project Control Diagram or Land Survey Control Diagram
- Equipment calibration reports including calibration baseline work sheets
- Field notes
- Preliminary survey scope form
- Pre-survey conference minutes
- Special use permits
- Traffic control plans
- GPS specifications
- GPS planning and network design reports
- GPS quality control reports
- Project control diagrams
- Land Survey control diagrams
- GPS control files
- InRoads .CTL file (text file used to process conventional surveys)
- InRoads PPT.CTL file (text file used for property ties)
- SDR 20 format file (Unedited and edited - real time kinematic survey or conventional survey, free of errors)
- Trimble .DC file (Raw and edited)
- CHARND request to Blue Book letter and Blue Book
- GPS zero baseline test results
- NGS adjust input and output files
- GPS station visibility diagrams
- GPS monument photograph log
- GPS observation logs
- GPS monument rubbing logs
- GPS fast static observation logs
- NGS station description / recovery forms
- Documentation showing that the horizontal control survey meets specifications
- Documentation showing that the vertical control meets specifications
- Documentation that the TMOSS survey meets specifications
- Monument records used in the survey along with photos of aliquot corners included in the survey. Monument records are as prescribed by Colorado Revised Statutes governing Land Surveying. See Colorado Standard Specifications for Road and Bridge Construction section 629 for CDOT monument record requirements.
- Copies of utility maps
- Copies of assessors maps
- Copies of deeds used in the survey
- Original copies of permission to enter forms
- Copies of maps or plats used in the survey
- Electronic data on a CD ROM
- Any photographs requested in the Preliminary Survey Scope
- All project related correspondence

Survey Plats. The Professional Land Surveyor Consultant that sets or accepts a monument shall prepare and file a plat in accordance with Colorado Revised Statutes. A copy of the plat and filing shall also be submitted to the CDOT/PM.

The surveyor in responsible charge of the work shall submit a Project Control Diagram for each task order that included a primary control survey and/or a Land Survey Control Diagram if the project makes ties to property corners or public land survey monuments. See CDOT Survey Manual for requirements for each type of control diagram. The control diagram shall be submitted before the FIR for the first project in the corridor. The control diagram shall include a table of geodetic coordinate values as well as a table of project coordinate values. The diagram shall include descriptions of all monuments. A statement if monuments were found or set must be included. A basis of bearing statement as described in Board of Registration rules must be included. A basis of elevation statement detailing the origin of the project elevation, a detailed description of the project bench mark and the project vertical datum. A statement defining the horizontal coordinate datum. A statement and formula of how the project coordinates were derived. A statute of limitation statement as called for in state statutes for land survey plats. A surveyor's statement that certifies to the accuracy of the survey is needed. A scale drawing of the surveyed area which accurately locates all monuments found and set in relation

to all improvements surveyed is required. The section township and range designation must be shown. The highway and milepost limits and the county must be included.

CDOT survey data processing will be accomplished with InRoads and MicroStation. These submittals shall use the CDOT configuration found at:
http://www.dot.state.co.us/DesignSupport/CDOT_Microstation_Inroads_Configuration/Index.htm

From Section 1.02-B-3 - All aerial products listed in the CDOT Survey Manual as deliverables:

- Presurvey Conference
- Photo Control Survey Report
- Flight Plan
- Camera Calibration Report
- Original Negatives
- Photo Index
- Contact Prints
- Photo Enlargement Prints
- Analytical Aerial Triangulation Report
- Planimetric Feature Identifications
- InRoads TMOSS Supplemental Survey
- 2D Planimetric Features
- Mapping Sheets
- 3D Break Lines with Mass Elevation Points
- Triangulation Irregular Network
- Digital Terrain Model (DTM)
- Digital Elevation Model (DEM)
- Contours
- Orthophotography
- Electronic data is to be in InRoads TMOSS format. Sample aerial InRoads TMOSS data is to be submitted early in the project development. Base map sheets are to include planimetric sheets, contour map sheets, and index maps as called for in the CDOT Survey Manual.
- Rectified digital photos. When designated in Scope of Work the Consultant shall submit rectified photography (at the designated approximate scale) with Mylar original plan sheets.
- Any other mapping or Photogrammetric products required by the task order

From Section 1.02-B-4-a-(5) - Project narrative includes all decisions made on property boundary locations. It includes the evidence used and the evidence accepted and rejected.

From Section 1.02-B-4-a-(6) - Copies of researched data including assessors information, documents that transfer title in order from newest to oldest for each adjacent owner, County road records, subdivision plats, re-plats, exemption plats, vacation documents and Memorandum of Ownership.

From Section 1.02-B-4-b-(2) – Right of way report that includes a cost estimate, a relocation evaluation, identified problem areas, ownership maps, land use maps, and impacts on future uses for each proposed alignment. Right of way mapping and monumented land survey plat of existing right of way may be required at this phase of the project. The plat must be filed in the appropriate county records.

From Section 1.04-A-4 - Area calculations shall include right of way COGO - A Coordinate Geometry Output file shall be submitted. See the CDOT Right of Way Manual Chapter 2. This is the basis of the right of way plan development and shall be "built" in a logical sequential order paralleling the plans development. Use the point numbering scheme as defined by the project manager. The generous use of notes and comments is desired in this COGO file. Area calculations shall be reported to the nearest square foot and to the nearest .001 acre.

From Section 1.04-A-12 - Right of Way Authorization Plans. Submit a progress report detailing the percentage of completion. Attach the "Project Narrative" (see below) along with the progress report. A progress report and narrative, as well as any other attachments, shall be submitted no less than at a one month interval.

Plan and map sheets shall comply with the following requirements:

- The original plan sheets shall be 11”x17”. See the project task order for the amount of copies.
- A half-size (11"x17") black and white (no hatching) plan set shall also be provided to the CDOT P.M.
- For right of way plans, see the sheet cell provided in the General Cell Library in the CDOT MicroStation configuration, sheets shall be provided as pre-setup Right of Way MicroStation drawings. All plan sheets shall utilize this drawing format. (See Electronic Data Submittals).
- The Consultant shall submit an example of an original plan sheet and receive approval from the CDOT/PM prior to drafting the plans.
- One set of 24” x 36” mylar shall be plotted for filing in the county records. This set is to be signed and sealed by the responsible PLS in charge of the work.
- A signed and sealed 11”x17” plan set for the record set.

2.02 Electronic Data Submittals

Photogrammetric data. Prior to generating mapping data the Consultant shall submit a sample of data and receive approval to continue the work. A sealed and signed hard copy (map sheets when appropriate) shall be submitted with all electronic data.

TMOSS data. Submittal of TMOSS data shall be on a CD-Rom. The final TMOSS data shall include the raw data collector files, the edited data collector files, the combined data collector segment files, a control file and any property pin files. The data shall run through InRoads with no errors or warnings when processed. The DTM shall produce no crossing break lines when processed through InRoads-Surface-View Surface-Crossing Segments. The data shall produce an accurate contour model of the actual ground with no elevation or rod height busts. The codes and notes shall be sufficient to allow a design engineer to accurately identify every feature surveyed without returning to the field. Each traffic sign shall be dimensioned and the text or symbol on the sign shall be included in a note immediately following the record for the sign location and include those items called for in the Preliminary Survey Scope. Each culvert and drainage structure shall be associated with a Drainage code 283 note described in the InRoads TMOSS Code Book. Each access opening, driveway, field access, and side road shall be associated with an Access code 277 note as described in the InRoads TMOSS Code Book. The InRoads TMOSS data file naming conventions are explained in Chapter 9 of the CDOT Survey Manual. There shall not be any duplicate point numbers.

Right of Way data.

- Right of Way plans shall be submitted as a *.DGN electronic drawing, prepared using the current CDOT standard naming convention.
- A MicroStation drawing of the entire ROW plan from beginning to end shall be included as a referenced MicroStation drawing for each plan sheet.
- The Consultant will use the drawings folders in the MicroStation file structures setup by the CDOT PM.
- MicroStation drawing files with the required CDOT borders will be supplied.
- A PDF file will be supplied in half-size (11"x17") for plotting purposes.
- All Electronic drawing files and plot files shall be submitted on a CD ROM or as approved by the CDOT Project Manager.
- All files created by the COGO software package (input, output, archive, etc.) shall be submitted.
- The parcel descriptions shall be submitted in Microsoft Word format.
- All other electronic files (spreadsheets, databases, etc.) shall be submitted.

It is suggested that the CDOT Project Manager be contacted prior to creation of magnetic media to verify the current submission requirements or to discuss any questions concerning the ability to satisfy the current submission requirements.

CDOT Computer/Software Information. The primary hardware used by CDOT is a PC-Windows system, and the types of software are:

Drafting - MicroStation (Compatible with current CDOT Edition)
Survey - InRoads Survey using the CDOT configuration
Geometry - InRoads Geometry

Electronic media submittals. CDOT can accept media of the following types and format:
CD ROM

APPENDIX D
SURVEY REQUIREMENTS (CONT.)

Required documentation. CDOT requires that each unit of the electronic media submitted be identified with adhesive labels affixed to the media containing the following MINIMUM information as applicable, depending on the media, format, etc. used to create the magnetic media being submitted:

- CDOT Project Number, Project code, and CDOT Project Manager's name
- Highway Number
- Begin Milepost # - End Milepost #
- Files name(s) and type(s) {ex. InRoads .FWD, MicroStation .DGN}
- Date created
- Contact Person and Telephone number(s)

A letter MUST accompany the electronic media which contains the same information as required on the media AND:

Either contains a description of the operating system commands used to create the electronic media or an attached computer generated listing of the actual process which created the electronic media (preferred). A task order may call for data to be submitted in fragments or partial submittals. If the submittal is a partial submittal, then it must be identified as a partial submittal on the transmittal letter and on the CD ROM. All information contained in any preliminary or incomplete submittals shall be resubmitted by the consultant with the final submittal.

A copy of the control diagram shall be submitted in electronic MicroStation format with the understanding that CDOT personnel for subsequent projects in the corridor may change the project numbers. The control survey diagram is included in the construction plans and therefore requires an original signature and seal from the surveyor in responsible charge on the record set of plans. The record set of plans is circulated for signatures after the project is advertised. This final review of the plans will not be paid for separately and shall be included in all task orders issued under this contract.

All material must be submitted to the CDOT Project Manager.